Medium-term goals

Constantly pursue higher management efficiency

Tokyo Electron is striving to improve productivity along the entire value chain, promoting greater standardization, efficiency, and automation of operations throughout the group, such as by integrating business systems in each division and unifying databases. Recognizing the importance of quality management, we are enhancing the awareness and capabilities of each employee regarding productivity by rolling out various educational programs. In addition, we are implementing continuous quality improvement activities throughout the supply chain in collaboration with suppliers. We will strive to enhance corporate value, constantly pursuing higher management efficiency by implementing more streamlined business operations and quality-focus operations.

Main activities

Promotion of improved productivity | Software development initiatives | Quality management | Improvement of quality in the value chain

- Promotion of improved productivity
  Continuous improvement of business operations
- Software development initiatives
  Streamlining product development, expanding global activities, Developing smart equipment
- Quality management
  Quality policy, Management system
- Improvement of quality in the value chain
  Improvement of quality in the value chain, Raising awareness and skills, Initiatives at the development and design stages, Response to quality problems, Response to safety laws and regulations, Initiatives with suppliers

SDGs initiatives

- Promote productivity, continuously increase management efficiency, contribute to the development of the industry and society, and contribute to sustainable economic growth
- Promote streamlined business operations and quality management throughout the value chain, ensuring sustainable forms of production and consumption

Decent work and economic growth | Responsible consumption and production | Partnerships for the goals

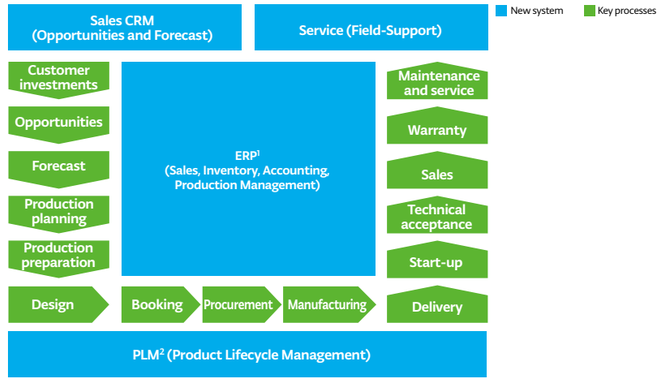
SUSTAINABLE DEVELOPMENT GOALS

Promotion of improved productivity

Continuous improvement of business operations

As part of its business innovation for productivity and quality improvement, Tokyo Electron (TEL) is tackling system and data integration across the entire TEL group value chain, such as development and manufacturing divisions, as well as sales and administration divisions. The primary objective of our project to introduce a new ERP[1] system is to integrate each of our division's previously discrete business systems, and to aggregate previously disaggregated internal data, enabling more centralized management. By freely utilizing the aggregated data in each business operation, we can quickly collect data needed for business decisions, make production schedules more reasonable and more efficient, visualize delivery dates for parts, and achieve stronger coordination between sales planning and production/procurement/inventory planning. To make the system fully operational in fiscal year 2024, we are proceeding with introducing the system in a way that does not disrupt existing production lines. Given that the system involves business operations performed by a range of employees, as we seek to bring the system to fruition, we are building an internal framework for cooperation, sharing the merits of migrating to the new system and updates on progress in a timely manner with all employees, including the project members.

Overview of ERP system



Software development initiatives

Streamlining product development, expanding global activities

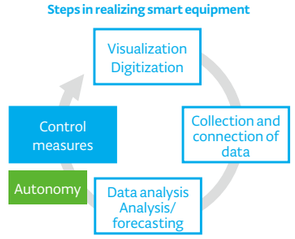
Since 1995, Tokyo Electron (TEL) has incorporated platform software developed in-house in its semiconductor production equipment, and has worked on streamlining operations and improving product quality. By standardizing platform software, we have been able to reduce the hours spent on developing duplicate functions for each type of equipment, leading to guaranteed real-time[3] control and enhancement of our response to new demands and technologies. Having adopted such concepts as object-oriented[4], we are also working on more efficient development of new platform software for the development of next generation equipment.

In addition, we are engaged in global activities to promote digital transformation (DX) development. As well as sharing information and various tools among responsible personnel in Japan and overseas, we are expanding a range of training programs, such as drawing up a data analysis skills map designed to improve DX skills throughout the TEL group.

Developing smart equipment

Amid advances in manufacturing that make the most of innovative technologies such as IoT and AI, our customers are forging ahead in improving productivity by taking advantage of visual representations of data, and building smart fabs[5] to improve consistency in quality. In this context, we are developing necessary software and systems for sites producing equipment, such as automation, for reducing work time. Our specialized development and manufacturing divisions, and business units work in cooperation to develop various functions for smart equipment, such as simple operation, presentation of the causes and resolutions of troubles, and autonomous operation through prediction of results.

Steps in realizing smart equipment



1 ERP (enterprise resource planning): A system that integrates the core business operations of an enterprise, such as accounting, personnel, production, logistics, and sales, for better efficiency and centralized information

2 PLM (product lifecycle management): The technique of keeping track of a single product in a centralized manner, managing the stages and processes in an integrated, cross-divisional manner with an aim of overall optimization

3 Real-time: The property of time limitation until the completion of work

4 Object-oriented: A software engineering theory

5 Smart fab: A fab that utilizes digital data to realize continual, progressive reforms of operational processes and improvements in quality and productivity

■Example initiative

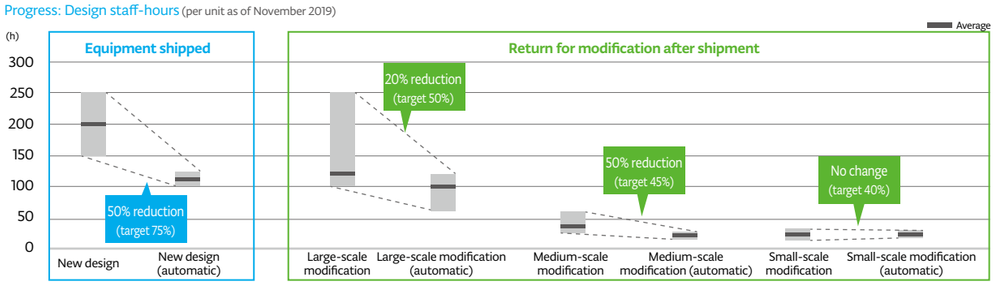
The Software Engineering Department at Tokyo Electron Kyushu is involved in designing, developing, and the testing and post-release maintenance of control software for coater/developer tailored to customer requests. In addition, it works to develop competitive software by constantly improving the development process and environment and nurturing human resources.

The department reviewed and redesigned the configuration and structure of software, mindful of any risk of bugs that might corrupt a program when making a design change due to the problem of the complexity in upgrading them as a result of years of software revisions. This eliminated complexity and improved maintainability, enabling the team to respond rapidly to customer needs.

Furthermore, over the years, the department has engaged in PDCA activities to improve the development process. After identifying that work quality had declined due to past operational practices and preconceptions, and that there had been a deficiency in sharing information on improvement measures, it renewed its appreciation of the importance of doing the simple things well. It consequently worked on re-learning the definitions, procedures, and measures in each step of the development process. It succeeded in reducing the amount of work spent on following up on non-conformance.

In the past, setting the hundreds of thousands of parameters necessary for control software to work in mass production design relied on veteran engineers' experience. In order to improve this individualized work and to generate accurate parameters more swiftly, the department developed "HCube"—an auto-generation tool. HCube was put into action in April 2019, and since then, the department has seen about a 50% reduction in time spent designing new equipment and upgrading shipped equipment. Other outcomes include a decrease in non-conformance attributable to human error. This achievement was also praised in a third-party audit as an endeavor worthy of note.

Progress: Design staff-hours (per unit as of November 2019)



Quality management

Quality policy

Tokyo Electron (TEL) has a quality policy shared by all group companies which it has developed and is rolling out.

1. Quality Focus
   Focusing on quality to satisfy customers, meet production schedules, and reduce required maintenance even with temporary cost increases.
2. Quality Design and Assurance
   Building quality into products, assure in-process quality control, from the design and development phase throughout every process.
3. Quality and Trust
   When a quality-related problem occurs, working as a team to perform thorough root cause analysis and resolve problems as quickly as possible.
4. Continual Improvement
   Ensuring customer satisfaction and trust by establishing quality goals and performance indicators and by implementing continual improvement using the PDCA cycle.
5. Stakeholder Communication
   Listening to stakeholder expectations, providing timely product quality information, and making adjustments as needed.

Management system

To provide consistent, high-quality products, TEL is building quality assurance systems under the leadership of the Representative Director and President. We have been promoting ISO 9001 quality management system certification, and all of our manufacturing companies have completed transition to ISO 9001: 2015.

ISO 9001 certified factories and offices

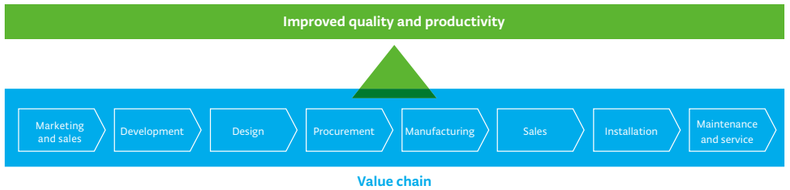
Company name	Factory/Office name	Certification date
Tokyo Electron Technology Solutions	Fujii Office/Hosaka Office	September 1994
	Tohoku Office	December 1994
Tokyo Electron Kyushu	Koshi Office	March 1997
TEL Magnetic Solutions	—	November 2009
Tokyo Electron Korea	Balan Factory	September 2011
Tokyo Electron Miyagi	Taiwa Office	September 2012
TEL Manufacturing and Engineering of America	Chaska Office	March 2013
	Billerica Office[1]	May 2014
Tokyo Electron (Kunshan)	—	May 2018

1 The Billerica Office was relocated in May 2020.

Improvement of quality in the value chain

Improvement of quality in the value chain

Tokyo Electron (TEL) believes that making ongoing improvements in all work processes contributes to improved quality and productivity of products and services. We will continue working hard to promote quality management throughout the value chain while keeping track of customer needs and strengthening internal and external collaboration.



Raising awareness and skills

TEL is striving to enhance the awareness of every employee toward quality by conducting various education programs. In addition to the basic education on quality that new employees receive, we have also globally rolled out PDCA Education and other programs that target all TEL group employees. In PDCA Education, employees learn about the need for continuous improvement through the four processes of plan, do, check, and act. As of FY2020, 84% of employees had completed this program.

QC certification holders

2,400

(as of FY2020)

We also implement our own education program, called TEL 6-Step, for employees closely involved in quality control, such as developers, designers, quality managers, and service personnel, through which they acquire a problem-solving model to handle important issues. The program is a modified version of the eight discipline (8D) problem-solving method[2], widely used in quality control, customized to replace our problem-solving process. The program cultivates the ability to resolve problems quickly and to take measures preventing recurrence, by thoroughly investigating the true nature of problems, and determining the technical factors and root causes. As of FY2020, approximately 5,800 employees had attended this program. We also conduct group training targeted at quality control leaders to provide them exercise-based learning opportunities for resolving quality-related issues to further enhance their work improvement skills at production and development sites.

Moreover, so that employees can tackle quality improvement autonomously, we advocate QC certification[3] and encourage them to acquire fundamental skills. Since fiscal year 2012, the number of QC certified employees has increased yearly to approximately 2,400 as of FY2020.

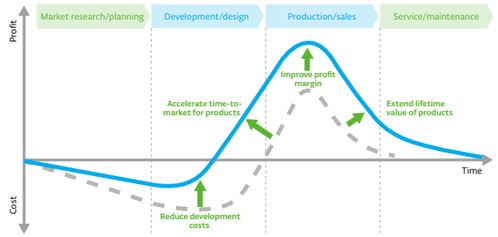
2 8D problem-solving method: A method for solving problems in quality improvement through eight disciplines or processes

3 QC certification: Quality management certification operated by the Japanese Standards Association and the Union of Japanese Scientists and Engineers. The total number of certified people nationwide exceeds 580,000 (as of September 2019)

Initiatives at the development and design stages

Promotion of Shift Left (front-loading) and self-process assurance systems

In order to improve the quality of products, it is important to prevent non-conformance from occurring in upstream processes, and to ensure thorough quality control in each process so that non-conforming products are not allowed to flow into later processes. From this perspective, TEL promotes "Shift Left" and self-process assurance systems. With Shift Left, in order to raise the degree of product quality at an early stage, we implement thorough risk detection and mitigation measures (FMEA[1]) from the initial stages of product design in an effort to suppress the occurrence or outflow of non-conformance. As for self-process assurance systems, we carry out thorough inspections in each process and conduct verifications using simulation. In conjunction with these promotion activities, we are also focusing on the deployment of Product Lifecycle Management (PLM). By deploying and promoting PLM, we comprehensively manage and analyze all processes from product planning, development, design, and production through to service, in an effort to facilitate the earlier release of products, enhance work efficiency, improve quality, and reduce costs.



1 FMEA (failure mode and effects analysis): Method to identify, prevent, and mitigate risks in advance

Response to quality problems

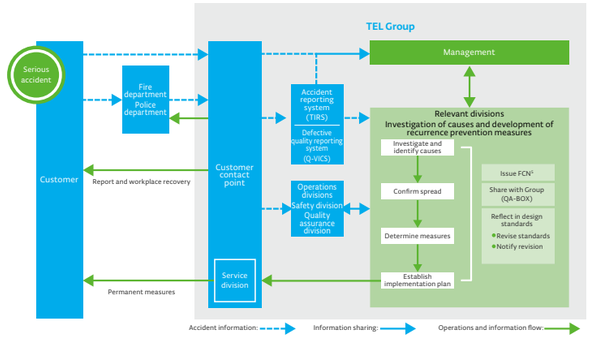
To comply with ISO and EN[2] safety standards and to achieve higher levels of safety, TEL has established its own design rules for each of its products. As an equipment manufacturer, we have developed systems for manufacturing products, which include safety considerations. We have other systems in place for responding to equipment design and production non-conformance and any occupational accidents.

In the event of an accident, we use our TIRS[3] accident reporting system to distribute information to safety and quality personnel in each division, officers, and management, including senior management. An accident investigation is also conducted immediately to identify the cause and plan preventive measures.

We also use a proprietary system called QA-BOX[4] to share information on equipment quality and any major non-conformance across all quality departments within the TEL group. Measures obtained from the results of an accident investigation are promptly applied, not only to the problem equipment, but also to relevant equipment operated by other customers, and revisions are made to current design standards. In the case of an accident caused by the wrong cable being connected, for instance, in addition to verifying the position and shape of the slot for inserting the cable and analyzing the factors that led to the human error, we are working to prevent a recurrence of the accident, such as by preparing procedures that are easier to understand.

Through QA-BOX, as well as getting relevant departments collaborating to share data on issues, remedies, and other accident-related information, we also assign the right personnel and work hard to prevent accidents from recurring.

Accident-related data accumulated in QA-BOX is utilized for the cumulative analysis of trends to visualize the types and frequency of problems for individual equipment, whereby we implement countermeasures that have an immediate impact. As we strive to prevent problems from recurring and their associated ripple effects, this is leading to a reduction in the number of accidents attributable to equipment.



Response to safety laws and regulations

TEL has systems in place to check and comply with the latest trends in laws, regulations, and guidelines for equipment safety. Equipment is checked by a third-party inspection organization before shipment, to ensure that it complies with safety requirements, such as international safety standards and SEMI S2[6]. Also, in response to the Machinery Directive and EMC Directive[7], we obtain certificates of conformity from the Notified Bodies in Europe.

2 EN (European Norm): Uniform standard for the European Union complimenting parts of technical standards not stated in European Commission directives ("New Approach" directives)

3 TIRS: TEL Incident Report System

4 QA-BOX: Tool for the sharing and horizontal expansion of important quality-related information within the TEL group

5 FCN (Field Change Notice): Refers to general recall notice

6 SEMI S2: Refer to Note 3 on p. 25.

7 EMC Directive: Refer to Note 5 on p. 25.

Initiatives with suppliers

Continuously improving quality based on strong partnerships with suppliers is essential for providing high-quality products quickly to the market. Since fiscal year 2001, TEL has conducted its unique Supplier Total Quality Assessments (STQA) in an effort to ensure its suppliers properly understand the level of quality it expects from them. Before starting business with new suppliers, an STQA is conducted via self-assessment to evaluate their product quality, costs, and information security. The assessment also includes their CSR initiatives, including human rights, ethics, safety, and the environment. If a risk is identified, we visit the supplier and confirm the area of non-conformance on site. Once our approach to quality has been confirmed, we request that they plan and implement improvement measures, and we provide continuous support until all of them have been completed. In addition, we also conduct on-site audits once every three years for suppliers who handle important components and for suppliers where quality issues have been found. Since STQA is a system shared by our whole group, STQA-L meetings are held regularly, gathering together leaders selected from among manufacturing companies to share supplier information and to resolve any issues.

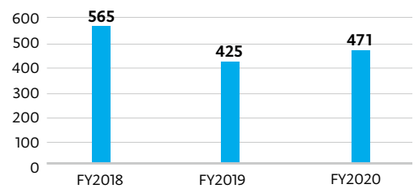
We are also focused on process improvement activities using SPC[1]. Invariably, our customers' production sites require limited variations in quality between equipment, accurate process repeatability, and high productivity. To meet these requirements, we get our suppliers who handle specific important parts to understand the importance of SPC, and we work on implementing SPC together with our suppliers to reduce variations in the quality of parts and to maintain and improve processes manufacturing good-quality products.

Example initiative

In the event a flaw, defect, or other non-conformance is found in a delivered part, time and money is spent in the production process, working to replace the part, investigate the cause, change production schedules due to process delays, and to implement other changes as needed.

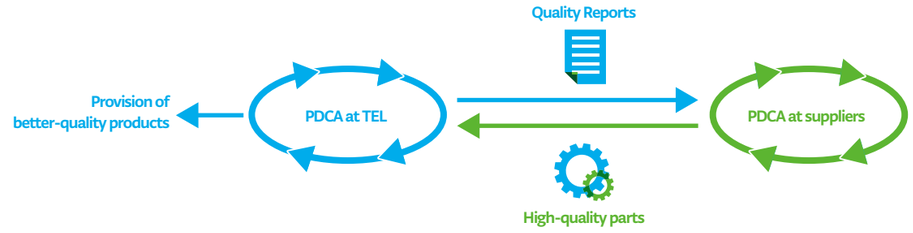
The Quality Assurance Division at Tokyo Electron Miyagi had previously limited its quality improvement activities to those suppliers with a large number of non-conforming parts. During the process of confirming the overall percentage of non-conformance and the associated causes, it came to the realization that these activities needed to be conducted for all suppliers. For this reason, since fiscal year 2019, it has issued its own Quality Report to all suppliers from which parts were found to be non-conforming, and by including statements on the supplier's level of quality and the monthly number of non-conforming parts, it has worked to reduce non-conforming parts and foster awareness for quality.

Number of non-conforming parts (full year)



In fiscal year 2020, the division issued reports to 108 suppliers, and as a result, non-conforming parts decreased by 17%[2]. One supplier acknowledged, "Using the Quality Report as a guideline to clarify issues related to quality helped us strengthen our overall capacity to supply parts." In addition to achieving a concrete outcome, that is, a decrease in the number of non-conforming parts, by sharing quality improvement activities based on qualitative data with suppliers, we are also working to raise our level of active communication.

Going forward, we will enrich the content of the reports by incorporating the feedback of suppliers and we will further accelerate our efforts to improve the quality of parts.



1 SPC (statistical process control): Refers to monitoring for abnormal values for the mean of a characteristic subject to control, and implementing process improvements

2 This figure is the actual result for FY2020 compared to FY2018