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

### Quality policy

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 and 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.

### ISO 9001 certified factories and offices

<table>
<thead>
<tr>
<th>Company name</th>
<th>Factory/Office name</th>
<th>Certification date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tokyo Electron Technology Solutions</td>
<td>Yamanashi Office (Fujii/Hosaka)</td>
<td>September 1994</td>
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<td></td>
<td>Tokorozawa Office</td>
<td>December 1994</td>
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<td>Tokyo Electron Kyushu</td>
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<td>March 1997</td>
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<td>Tokyo Electron Koshi Office</td>
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<td>TEL Magnetic Solutions</td>
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<td>Tokyo Electron Akita</td>
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<td>TEL Electronics</td>
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<td>Tokyo Electron Miyagi</td>
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<td>TEL (TE)</td>
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<td>TEL (Korea)</td>
<td></td>
<td>May 2014</td>
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<tr>
<td>Tokyo Electron (Kunshan)</td>
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</tbody>
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### Improvement of quality in the value chain

**Quality management throughout the value chain**

Tokyo Electron (TEL) believes that implementing continuous improvement, not only of products and services but also of all work processes, contributes to improved quality and productivity. The company strives to improve operations throughout the value chain, while strengthening collaboration within the company and externally, reflecting the needs of customers.

**SDGs initiatives**

- **Promote improvement of productivity, continuously increasing management efficiency, contributing to the development of the industry and society, and contributing to continuous economic growth**
- **Promote quality management throughout the value chain, ensuring sustainable forms of production and consumption**
- **Decent work and economic growth**
- **Responsible consumption and production**
Raising awareness and skills
TEL believes in the importance of every employee having a high awareness and understanding of quality, and conducts various educational programs to this end. In addition to the fundamental quality education that all new employees receive, we focus on PDCA education for all employees, including those overseas. Through e-learning courses, employees learn the need for continuous improvement using the iterative four steps of the PDCA cycle. As of May 2019, 93.7% of our employees had completed the courses.

In addition, the company implements its 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. It is a partially altered version of the eight-discipline (8D) problem-solving method, widely used in quality control, customized to replace TEL’s problem-solving process. The program enables thorough investigation of the true nature of problems to determine the technical factors and root causes, cultivating skills that lead to quick resolution and prevention of similar problems arising. TEL currently uses e-learning training for delivery, and as of May 2019, approximately 8500 employees had completed the program. In addition, the company conducts group training, focused on quality control leaders at its bases, for practical, exercise-based learning about resolution of quality issues, in an effort to enhance work improvement skills at production and development sites.

Moreover, TEL encourages employees to obtain external QC certification through the Quality Management (QM) and Quality Control (QC) examinations and recommends their acquisition of fundamental skills, so that they can autonomously tackle quality improvement. Since fiscal year 2012, the number of certified employees has increased each year to approximately 2,200 as of March 2019.

Initiatives at the development and design stages
Promotion of front-loading and self-process assurance systems
In order to improve the quality of products, it is important to avoid contamination by defects in upstream processes, and to ensure quality in each process so that defective products are not allowed to flow into later processes. From this perspective, TEL is promoting front-loading and self-process assurance systems. In order to raise the degree of product quality at an early stage, TEL implements thorough risk detection and mitigation measures (FMEA)3 from the initial stages of product design in an effort to suppress the occurrence or outbreak of defects. The company also conducts thorough inspections in each process and verification using simulation in the self-process assurance system. Together with this promotion of front-loading and self-process assurance systems, TEL is also focusing on the deployment of Product Lifecycle Management (PLM). By deploying and promoting this concept of PLM, TEL comprehensively manages and analyzes all processes from product planning, development, design, and production through to service, in an effort to achieve early release of products on the market, work efficiency enhancement, quality improvement, and cost reduction.

Response to safety laws and regulations
TEL regularly checks the safety regulations and guidelines concerning equipment, and has established systems for responding to them. Equipment is checked by a third party inspection company before shipment to ensure that the equipment complies with international safety standards and the guidelines like SEMI S2.5 Also, regarding the Machinery Directive and EMC Directive,¹ we obtain certificates of conformity from the Notified Bodies in Europe.

Example initiative
Through the Quality Management Committee, Tokyo Electron Technology Solutions Yamanashi Plant implements consistent quality control, from the development and design stage through to mass production, managing the progress of development, sharing quality issues, and so on.
With new development projects, the Yamanashi Plant checks thoroughly to ensure quality and reliability requirements are sufficiently fulfilled, by establishing “gates” at each stage of conceptual design, transition to release of plans, shipment of evaluation units to customers, and transition to mass production.

To ensure this initiative, session-based DRs are held by persons in charge of design development, quality control, production, purchasing, sales and other related divisions, together with experts who possess technical knowledge. When transitioning to mass production of equipment, a “mass production package,” comprised of a BOM,² a QC process chart,³ a manufacturing quality instruction manual,⁴ a startup manual⁵ and so on, is prepared to ensure mass production operations are also carried out in full, and self-process assurance systems are established. Providing education to workers and managing their skills is also conducive to activities aimed at the release of high-quality equipment.

Going forward, to further develop quality improvements, ongoing improvement activities will be promoted so that, based on an original evaluation model, essential evaluation points are applied without fail in order to maximize quality at each stage of the manufacturing process, from planning (concept level) through to the parts and materials level.

1. DR Design Review
2. BOM (Bill of materials): A list of parts and hardware how many of each are used for each finished product
3. QC process chart: A chart recording the process flow for production from procurement of raw materials and parts to shipment of the finished product, including a process flow chart (characteristics and methods)
4. Manufacturing quality instruction manual: a set of instructions and guidelines translated from the design to the manufacturing team
5. Startup manual: a set of procedures and manuals for starting up production equipment
6. SDM-D: This is an act of environmental loads, emissions, and energy consumption for semiconductor manufacturing equipment
7. EMC Directive: The Electromagnetic Compatibility Directive that applies to electronic and electrical equipment

PDCA of Quality Review Committee
- Improve business processes
- Comply with change management
- Evaluate reliability
- Improve DR quality
- Manage shipping of evaluation units
- Improve supplier quality
- Improve manufacturing quality
- Improve reliability
Higher productivity

Software development initiatives

Streamlining product development
Since 1995, Tokyo Electron (TEL) has used platform software developed in-house in its semiconductor production equipment, leading to streamlined operations and improved product quality. By introducing common platform software, the company is able to reduce the hours spent on developing duplicate functions for each type of equipment, to guarantee real-time control, and to develop new equipment and technologies.

In addition, TEL is also adopting concepts such as object-oriented for more efficient software development, while also promoting development and introduction of new platform software for development of next-generation equipment.

Realization of smart equipment

With the rapid progress of innovation in manufacturing utilizing IoT and AI, TEL is working on designing the form of future semiconductor production equipment required in the smart fabs, which customers aim to realize, and to develop the various software and systems that will be required there. The specialized development units responsible for advanced equipment and system development cooperate with each business unit and production site in the pursuit of smart equipment that offers simple operation, presentation of the causes and resolutions of troubles, and autonomous operation through prediction of results.

Initiatives with suppliers

Developing strong partnerships with suppliers is essential to improve product quality. In efforts to maintain and improve quality, since 2000, TEL has conducted its unique Supplier Total Quality Assessments (STQA) to enable its suppliers to properly understand the level of quality that the company expects from suppliers. 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 CSR issues, including human rights, ethics, safety, and the environment. If any risks to quality are found, TEL provides feedback to the supplier on-site to explain the problems, TEL’s expectations for the level of quality required. After the supplier understands the issues, TEL asks them to plan and make improvement measures, and provides continuous support until all of the improvements have been completed. The company conducts on-site audits once every three years at suppliers who manufacture important components and at suppliers where quality issues have been found.

In recent years, TEL has been particularly focused on process improvement activities using statistical process control (SPC). Equipment that TEL provides to its customers must always be controlled to avoid variations, to ensure accurate process repeatability, and to realize high productivity. To achieve this, TEL works to ensure understanding of the importance of, and agreement to, these activities by suppliers which handle specific important parts, and works on SPC together with suppliers, in order to reduce variations in the quality of parts, in an effort to maintain and improve processes to produce good products.

Example initiative

At all of its production sites, TEL collaborates with suppliers to implement initiatives to reduce the occurrence of defective goods. Company employees visit the production sites of suppliers to learn about their production environment in order to discuss and implement effective improvement proposals. In addition, Tokyo Electron Technology Solutions Yamanashi Plant works closely with business partners to share data on parts and unit manufacturing, and to promote quality management through SPC, and is thereby delivering results in defect rate reduction.

Response to quality problems

In addition to compliance with ISO and EN safety standards, TEL establishes design rules applicable to its own equipment to achieve the highest level of safety possible. In addition to developing systems to manufacture safe products, the company fulfills its mission as an equipment manufacturer by establishing systems for responding to design- or manufacturing-related issues or accidents arising from operation-related problems.

If an accident occurs, TEL uses its TIRS accident reporting system to report and share information with all levels of management, and safety and quality personnel in each division to senior management. We immediately conduct an accident investigation to identify the cause and plan preventive measures.

In addition, TEL uses a proprietary system called QA-BOX to share accident information within TEL Group. The results of accident investigations are quickly implemented on the problem equipment, as well as on equipment operated by other customers, and, for example, reflected in design standards in operation. As well as sharing problems and countermeasures through QA-BOX, it is also used to prevent recurrence of accidents. Accident-related data accumulated in QA-BOX is used for the cumulative analysis of trends to visualize the types of equipment which frequently experience problems and the types of problems that they experience, whereby we can implement countermeasures that have an immediate impact, leading to a reduction in the number of accidents attributable to equipment.

Response to serious accidents

Initiatives for accident prevention

1. Monitoring
   Real-time monitoring of results of data analysis

2. Analyze
   Prediction and forecasting based on digital analysis

3. Control
   Implementation of SPC

4. Autonomy
   Autonomy refers to self-learning and self-adjustment.
   (Learning, trial and error)

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