



Quality

Knowing our customers' real needs enables us to attain world-leading product quality.

Winning the trust and satisfaction of our customers requires precise understanding of their critical needs. TEL attentively listens to customers and uses this feedback to continually improve all aspects of operations, resulting in even higher quality products and services.

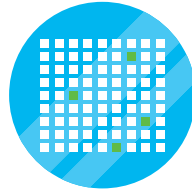
Highlights



Customer satisfaction survey

62%

Receive 3.0 or more points (Very Satisfied or Satisfied) on a 4.0 scale for 62% of questions.



Percentage of wafers with no-defect after introduction of TELeMetrics™

Up 2.3 percentage points

Goals and results for fiscal year 2016

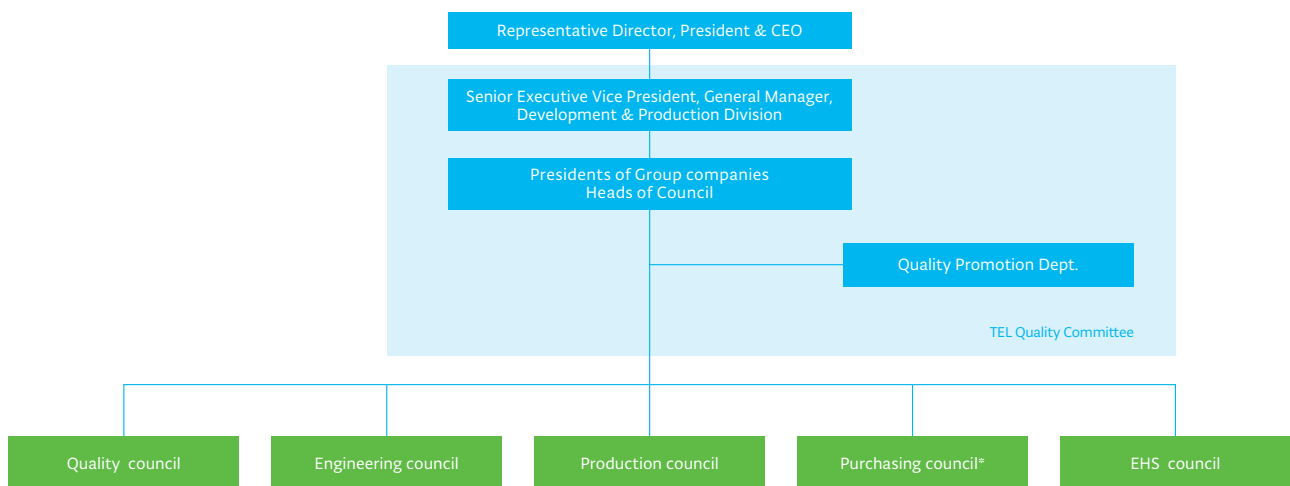
Theme	Goals	Results
Quality improvement	<ul style="list-style-type: none"> Reduce accidents that result in property damage. Reduce product-related accidents resulting in property damage by 20% year-over-year across the organization. 	<ul style="list-style-type: none"> Reduced these accidents by 14.5% year-over-year.
Improving customer satisfaction	<ul style="list-style-type: none"> Improve quality of equipment training. Score an average of 4.0 points or more on a 5.0 scale in trainee feedback. 	<ul style="list-style-type: none"> Scored an average of 4.6 points, receiving 4.0 points or more for all questions.
	<ul style="list-style-type: none"> Improve customer satisfaction. Receive 3.0 points or more on a 4.0 scale for all questions in the customer satisfaction survey. 	<ul style="list-style-type: none"> Received 3.0 points or more for 62% of questions.
Compliance	<ul style="list-style-type: none"> Compliance Implement the PDCA continual improvement cycle to check compliance with regulations and processes in TEL. 	<ul style="list-style-type: none"> Implemented compliance checks at 8 key sites.

Framework

TEL has a quality assurance framework headed by the Representative Director and President and supported by the Senior Executive Vice President in charge of Development and Production. Quality improvement, as well as other important quality issues and other shared concerns, are addressed through collaboration amongst TEL presidents and the Quality General Managers (GMs). To ensure efficient and stable quality control, TEL has five working groups in place, including the Quality council, Engineering council, Production council, Purchasing council, and EHS council. These working groups collaborate to pursue organization-wide quality assurance activities across all divisions.

To constantly maintain high quality standards, TEL has also been working since 1997 to acquire ISO 9001 quality management system certification at various sites. Ten sites (primarily manufacturing operations) have achieved this certification to date.

Thanks in part to our efforts under this framework, there were no legal or regulatory violations of TEL's products and services in fiscal year 2016.



* Official name: Purchasing department manager council

Product quality

Initiatives for improving quality

TEL is continually improving the quality of its products to win customer satisfaction and trust. An important statement from the quality policy is that “We build quality into every TEL product during the design phase by focusing on leading-edge technology. By bringing quality into our processes early and focusing on quality throughout all processes, we succeed in providing high quality products and services.” This is the foundation of our quality assurance activities.

Specifically, we have adopted the front-loading approach. This involves identifying and solving problems early in the product development and design processes to enhance design quality. In addition, we have expanded our training programs and established a system to verify skill levels in order to improve individual skills and design quality, ultimately ensuring proper identification of problems and appropriate analysis.

In addition, we implement in-process quality control¹ during each process—from development and design to shipment. Semiconductor production equipment consists of various components and modules, and assembly involves multiple processes. Making each of the manufacturing processes responsible for component quality is very effective, significantly reducing production costs and defects. Each of our process teams constantly seeks improvement, helping to produce superior products by taking ownership of quality assurance within a given process.

Because the quality of each component can affect the overall quality of the end product, we also focus on the quality of components early in the design phase. TEL’s development and quality assurance divisions exchange information among themselves and with suppliers in order to improve the quality of drawings and purchase specifications. This also enables early sharing of component information. As a result, the quality of components has improved, leading to fewer component defects.

¹ in-process quality control: The idea that, at each process, employees take responsibility to ensure product quality with no defects

Education

To promote high-quality manufacturing in alignment with customer needs, TEL continually carries out cross-functional quality improvement activities with involvement of not only its development and design departments but also other departments such as planning, sales, administration and field service. As part of these efforts, we encourage TEL employees to obtain external quality certification. Administered by the Japanese Standards Association and the Union of Japanese Scientists and Engineers, the QM/QC Exam (Quality Management and Quality Control Examination) is a major quality certification, with more than 363,000 certification holders in Japan as of September 2015. The certification enables employees to improve their knowledge and skills in the area of quality control, improve the quality of their work, and provide customers with high-quality products. Starting in fiscal year 2012, this initiative has increased the number of certified employees each year to a total of 1,273 as of March 2016.

In addition, we are also educating our employees in the Plan, Do, Check, Act (PDCA) cycle. Although PDCA is most frequently used to improve management of production and quality, we have chosen to employ this method in every aspect of our business, not just in production activities. PDCA is already being used in many areas, driving process efficiency and greater value for our customers.

Response to quality problems

Despite our efforts to produce high-quality products with the front-loading approach, in-process quality control, and employee education, unforeseen quality problems occur from time to time. When any such problem is reported by customers, the information is fed into our proprietary Q-VICS knowledge management system. This information is distributed to the departments concerned, enabling information sharing and quick problem resolution. If disclosure of defect information is deemed necessary based on our internal criteria, we issue necessary technical documents and inform our customers.

For particularly serious problems, we employ the TEL 6-Step problem-solving model, a customized version of the eight discipline (8D) problem solving method¹ widely used in quality management. The TEL 6-step model enables systematic and highly reliable analysis of a problem to determine the root cause, leading to quick implementation of countermeasures and preventing recurrence of similar problems. We are currently training our personnel to actively use this method.

When a quality issue occurring in one business unit has the potential to affect other business units, we use a proprietary system called QABOX to prevent the problem from spreading. The system allows relevant information to be centrally managed on our secure network. The information is shared with quality assurance managers at TEL manufacturing companies and with the corporate quality division to discuss appropriate resolution. Following the discussion, critical information is reported to the corporate executive officer in charge of quality to quickly determine the future actions on the issue.

1 8D problem solving method: A quality improvement method for solving problems through eight disciplines or processes

Streamlining operations

Quality and productivity improvement through TPM

TEL has been implementing TPM² for over ten years. The purpose of TPM is to eliminate inefficiencies, waste, and loss, and thereby improve productivity. The TPM approach is playing a role in employee education and skill development and has been successfully integrated into our production lines. TPM activities that have produced outstanding results are shared with the rest of TEL at the annual TPM presentation. In fiscal year 2016, the participants included not only teams from Japanese manufacturing sites but also the first overseas presenters from Tokyo Electron (Kunshan) Limited (established in 2012).

2 TPM: Total Productive Maintenance or Total Productive Management

Production division initiatives

At Tokyo Electron Miyagi Limited, the standard practice was to hold shipment of the equipment until all component modules were available. Because of this, many of the finished modules had to be kept in the clean room for an extended period, taking up precious production space. Accordingly, the team in Miyagi revised the process management practices during the production planning phase. They adopted a module-based rather than product-based logistics approach, ensuring no deterioration in the quality level. The change allowed the modules to be packaged and shipped as they were finished. At the same time, improvements were made in the loading area layout as well as in shipping list preparation and cargo packaging. This freed up even more production space and improved productivity while reducing lead time. Additionally, the new approaches have made it easier to respond to any changes in specifications that customers might require.

Administrative division initiatives

TEL is pursuing TPM not only at its production sites but also in its factory administration and sales departments. As a manufacturer of production equipment, we need to communicate our customers' technological needs for improving productivity (including system modifications and enhancements) to the Development & Production Division as quickly as possible. This allows us to share the information and respond with actual products. Accordingly, we have established a system capable of processing customer requests within 24 hours of receipt. We have also standardized the system modification formats and request forms in an effort to remove ambiguity in the requests. This has enabled the departments concerned to share highly specific information and respond more quickly to customer requests. To better manage requests for substantial modifications to our equipment, we have also improved the ordering system for products with long lead times to achieve faster delivery.

Consideration for customers

Customer satisfaction

Improving customer satisfaction

Accurately assessing customer needs is critical to providing quick, innovative solutions. TEL's policy on quality and service states, "TEL strives to understand the true needs of our customers to achieve customer satisfaction and secure customer trust while continuously improving quality and service." Under this policy, TEL has a customer satisfaction system headed by the President. This enables TEL to engage in various activities to offer high value-added products and services to meet customer needs now and in the foreseeable future.

Customer satisfaction survey

TEL conducts a customer satisfaction survey every year, with the goal of making continual improvements based on customer feedback.

The survey started in 2003 with a limited number of sales departments. Since then, TEL has made numerous improvements in the questionnaire, survey method and analysis, feedback to customers about targeted improvements, and overall management of the program. The survey grew to include all semiconductor production equipment departments in 2014. The FPD production equipment division and overseas subsidiaries were added in 2016 to make the survey a key organization-wide initiative. The questions are designed to allow multi-faceted analyses of customer opinions, so the feedback can directly lead to practical improvements in the sales, development and production, and service divisions.

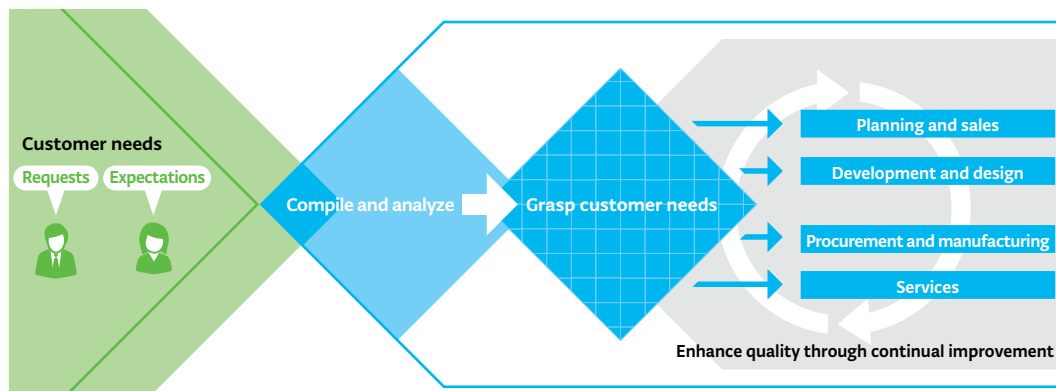
In the survey for fiscal year 2016, over 1,000 individual customers responded, and the results were satisfactory. On a 4-point scale (from 0 to 4), TEL received an average of 3 points or higher (Very Satisfied or Satisfied) on 62% of the questions. For questions that were rated below 3.0, we have analyzed the results to further improve the quality of our products and services.

Responding to customers' suggestions for improvement

Each year, we receive many important suggestions from our customers through this survey. The results are shared in a timely manner, not only by the management team but also by the sales, development and production, and service departments. When improvements are identified from the customer responses, we assign a responsible department for each area and implement corrective actions. In this manner, we make full use of the responses to the survey—both positive and negative—to improve our services and product development. We also regularly communicate the results of the survey and our plans for improvement to our customers.

By engaging in organization-wide PDCA activities on an ongoing basis, TEL provides comprehensive and innovative solutions to its customers.

Conceptual image of understanding customer needs



Improving customer productivity

In addition to providing high quality products to customers, TEL also recommends ways to operate the equipment most efficiently at customer fabs and offers optimization services.

TEL has introduced TELeMetrics, a service that connects the equipment installed at customer sites with TEL via a communications network, enabling TEL to monitor and analyze data to improve equipment performance. Specifically, the service takes advantage of TEL's unique technological insights and specialized analytic tools to multilaterally analyze data such as equipment functionality, component degradation over time, and product variability. This allows TEL to identify problems in real time and offer appropriate solutions. This service can significantly reduce the costs for installation, operation, and management of facilities and equipment. TELeMetrics also has a proven record of improving the overall efficiency of facilities at customer fabs.

For example, one customer reported that TELeMetrics successfully reduced the percentage of non-uniform wafers from 2.8% to 0.5%. As the yield improved, the customer could also reduce the impact on the environment and reduce costs.

Effects of TELeMetrics on the rate of wafer non-uniformity (%)^{*}



^{*} In low-pressure chemical vapor deposition (LP-CVD) processes

TEL receives Intel's prestigious SCQI award

TEL received Intel Corporation's prestigious Supplier Continuous Quality Improvement (SCQI) award in March 2016.

The SCQI award is part of Intel's Supplier Continuous Quality Improvement program to encourage Intel's key suppliers to strive for excellence and continual improvement. Only the highest performing suppliers receive this honor. TEL provides coater/developers, dry etch systems, wet etch systems, thermal processing systems, deposition systems, and test systems, all essential to Intel's success. TEL was selected as one of eight companies to receive this honor. The award illustrates TEL's exceptional performance in attaining Intel's goals in 2015 and demonstration of industry-leading commitment across all critical focus areas measured: quality, cost, availability, technology, customer service, labor and ethics systems, and environmental sustainability. This was the 16th consecutive time that TEL received this quality award, and we intend to keep demonstrating stellar performance on cost competitiveness, leading-edge technology, quality programs, and outstanding customer service.



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Photo: Chip Holley Productions