Product-related Environmental Initiatives

TEL is eagerly executing Life Cycle Assessments (LCA) on an ongoing basis.

Reducing the Environmental Burden of Products

TEL has strived to incorporate suggestions from customers into its products and promoted the reduction of environmental burdens during semiconductor production, as well as eliminated harmful substances from materials used to make equipment. We respect and have placed great importance on the need for customers to know about the environmental burden of products throughout their life cycles. As a result, we work as quickly as possible to collect and compile data relating to these impacts during each stage of a product's lifecycle, manufacture, use and disposal. Currently, by effectively applying the LCA data and the product design data that we have accumulated, we have reached the top position in our industry. Furthermore, we are constantly striving to incorporate environmental considerations into our business from all and any angles possible, such as our initiative to conserve energy by reducing heat released to the clean room.

Organization for Lowering Environmental Burden

TEL has clarified items that can be uniformly addressed as well as listed priority items for the entire group in relation to reducing environmental burden in equipment, while at the same time striving to enhance performance from an environmental perspective. We have also created an Eco Design Working Group (WG) under the Product EHS Technical Committee (see page 10), which is focusing on energy and resource conservation.

In terms of LCA, currently in each Business Unit (BU) and Division, we are compiling data on the environmental burden of newly-developed equipment and using findings to improve equipment or next-generation machines. In addition, we have also established a Lead-Free Task Team with the aim of implementing a lead-free policy from production in 2006.

In addition to internal activities, we have also established a Green Procurement WG, which has clarified TEL procurement standards — based on the need to consider the environmental burden in purchasing materials for equipment production — and conveyed these to suppliers.

We investigate the environmental approaches of our suppliers, and, when necessary, provide them with environmental education to support their environmental activities.

In TEL equipment, EHS related items have become required by customers, and it is an important task to integrate the EHS concept from the development and design phase of the products at an early stage. Furthermore, as the globalization of our company advances, adapting to local legal systems in various countries is increasingly necessary. To respond to these demands we are actively pushing ahead with Design For EHS.

TOPICS

Implementing LCA for Newly-Developed Equipment

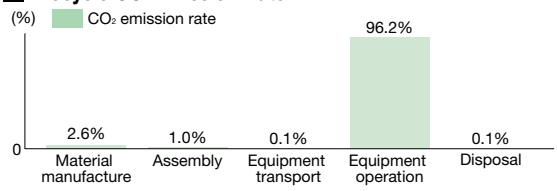
We are carrying out LCA as a means of objectively evaluating the environmental burden of our products via the TEL.

The equipment that we are showing you here is the Trias™ SPA. This is a wafer nitridation and oxidization film deposition system that was jointly developed with the support of Japan's Ministry of Economy, Trade and Industry and Tohoku University. As the miniaturization of semiconductor processing advances, the damage caused by conventional plasma processing can no longer be ignored. Trias SPA employs SPA (Slot Plane Antenna) to perform plasma processing without damaging the wafer while satisfying the demands of producing high-density plasmas at low electron temperatures. TEL performs LCA for equipment that uses new technology, such as this, and determines the environmental load per life cycle. By feeding back these evaluation results into new, next-generation equipment development, we are striving to reduce the environmental burden. TEL was also awarded the Prime Minister's Award for the Trias SPA at the second conference on promoting of Industry-Academia-Government Collaboration held in Kyoto in June 2003.

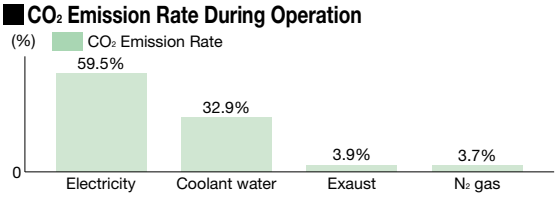
Trias SPA

Prime Minister's Award certificate and plaque

Lifecycle CO_2 Emission Rate



CO_2 Emission Rate During Operation



Conserving Energy in Clean Rooms

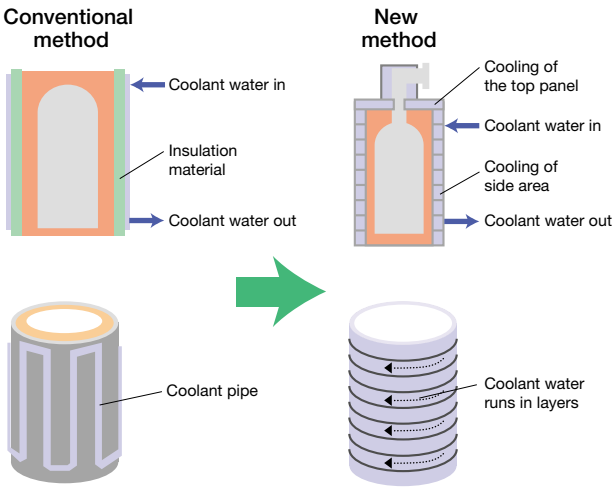
A Shift in Heat Sources and Cooling Methods

One of TEL's main products, the Thermal Processing System, conducts film deposition on wafers during the manufacturing of semiconductors at very high temperatures. In the clean rooms, where this process takes place, the amount of particles (microscopic dust, etc.), the temperature and the humidity are controlled with a special air conditioner. The high temperature processing in the clean room makes these air conditioners work extremely hard and consequently increases the consumption of the energy. In order to reduce energy consumption, TEL's new product TELFORMULA™ uses a new method.

In conventional systems, the heat generated inside the equipment while processing a wafer is released to the outside via coolant water running through pipes located on the outer rim of the heat generating area, and thus heat is directly released from the surface of the equipment to the clean room and controlled. TELFORMULA is structured so that the coolant water runs in layers and inside the top panel, improving the heat absorption rate. With the realization of this new method has arisen the possibility that we can greatly cut electricity consumption in clean rooms.

TELFORMULA

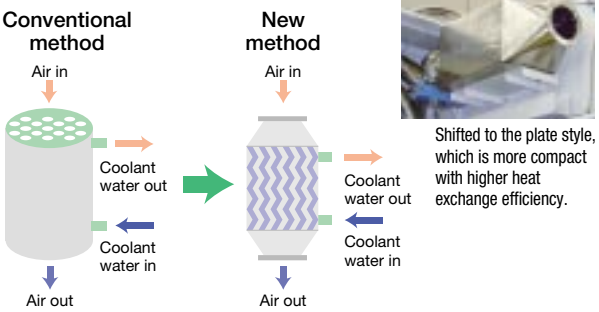
Change in Heat Source Cooling Method



Shifting to More Efficient Method of Heat Exchange

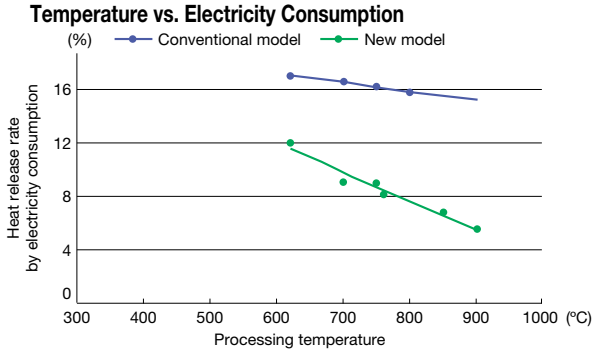
To realize better heat absorption efficiency than available via conventional heat exchangers, we have adopted a plate-style device that is more compact. As a result, the burden placed on the clean room by the heat released from the heat exhaust pipes has been reduced.

Heat Exchanger Change



Shifted to the plate style, which is more compact with higher heat exchange efficiency.

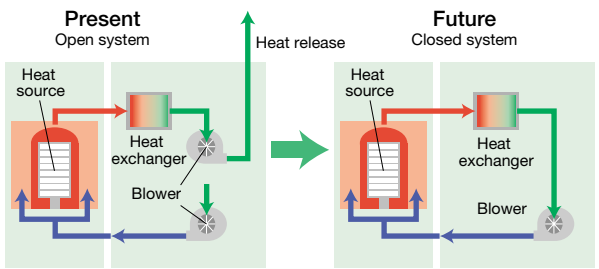
Heat Release Rate and Processing Temperature vs. Electricity Consumption



Coming Initiatives

Based on these new methods and system developments, we are considering a closed system employing a quick cooling system as a means of countering heat release for the next generation.

Creating a Closed System with the Quick Cooling System



Product-related Environmental Initiatives

Lead-free Initiative

The use of harmful materials such as lead, mercury and cadmium in consumer electronic products will be banned come June 2006 in the European Union (EU) under WEEE*1 and RoHS*2. Although semiconductor production equipment does not fall under the scope of these directives, TEL endeavors to take preventive measures against pollution and is forging ahead with efforts to realize lead-free processes.

TEL has established a Lead-free Task Team composed of representatives from each company, BU and Division to implement lead-free solder. Specifically, in FY 2004 they investigated the current situation with our suppliers. In FY 2005, we intend to clarify the major issues and tasks with suppliers, formulate technical standards, review introducing this methodology into the manufacturing processes, decide the items for the unit evaluation and execution, and to decide the assembly evaluation items and the unit, while responding as an organization.

*1 WEEE: Waste Electrical and Electronic Equipment

*2 RoHS: Restriction of the use of certain Hazardous Substances in electrical and electronic equipment

■ Lead-free Implementation Plan

Targets	FY 2004				FY 2005				FY 2006				FY 2007	
	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.	July	Oct.	Jan.	Apr.	July
Formation and launch of Lead-free Task Team and its activities	→													
Policy announcements (to suppliers)	→													
Consideration of technology and materials to be adopted	→													
Supplier survey, cooperation and action plan	→													
Cooperation on countermeasures with OEM makers					→									
Evaluations of module units, boards						→								
Evaluation embedding modules, boards								→						
Production preparation									→					
Production								To be implemented after 2006				→		

TOPICS

Large Reduction in Developing Solution Consumption

TEL focuses on reducing environmental burden as well as costs, and we are making efforts to reduce the consumption of chemical solution used when operating equipment.

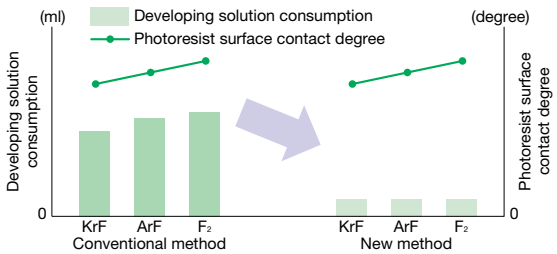
During the lithography process, a pattern is transfered onto the wafer surface by applying an organic photosensitive chemical, known as photoresist; then, the developing process is performed. The most common developing process uses TMAH (tetramethylammonium hydroxide) water solution. Miniaturization of semiconductor technology tends to make the surface of the photoresist more prone to shed water. The conventional paddle developing method uses a larger amount of the developing solution due to the increased water-resistance of the photoresist surface.

TEL has invented a new nozzle and a developing method that reduces the developing solution consumption to one-fifth of the conventional method, regardless of the photoresist surface water-resistance. We are currently pushing ahead with plans to adapt this method to our coater/developer technology for our main product line, the CLEAN TRACK LITHIUS and CLEAN TRACK ACT™ series.

CLEAN TRACK LITHIUS

■ Developing Solution Consumption

The graph indicates the developing solution consumption needed for one wafer (one developing). Currently, the most advanced process uses ArF photolithography and more developing solution is consumed than with the conventional KrF method. This tendency is expected to continue to the F_2-laser photolithography, which is being considered for the next generation.



Our Stance on Green Procurement

We procure raw materials and parts from outside TEL to be used in our main products — semiconductor and FPD production equipment. In order to reduce the environmental burden of TEL's business activities, the procured parts and the raw materials need to be produced with the environment in mind. For that reason, TEL procures materials from suppliers that are actively engaged in activities to reduce the environmental burden based on the green procurement guideline*. In the future, we plan to limit our procurement only to the suppliers that meet certain environmental standards.

* Green Procurement Guideline: Standards and targets for chemicals and energy conservation, packaging, resource conservation, recycling, and information disclosure.

Green Procurement Guideline

Green Procurement Action Plan

Theme	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008
Green procurement for equipment and parts					
Supplier surveys and instruction in improving environmental management	Survey/ Improvement guidance	Survey/ Improvement guidance	Survey/ Improvement guidance	Survey/ Improvement guidance	Survey/ Improvement guidance
Reviewing supplier relationships	Reviewing supplier relationships				
Compose lists of materials prohibited from use in products	List composition				
Collect data and request cooperation on materials prohibited from use in products	Data collection/Establish master parts registration				
Replace parts containing prohibited materials	Promote designs that do not use materials prohibited from use in products				

Clarifying Materials Prohibited or to be Reduced in Products

TEL has formulated a list of materials contained in product parts and materials beyond those chemicals regulated by law, while clarifying which substances are being used and promoting the reduction or substitution of chemicals with our Guidelines for Chemicals Banned from Use in Products or to be Reduced. We have begun surveying our suppliers to determine whether they are using any of these substances. We also plan to build a system where all chemical substances contained in parts and materials are registered in an integrated database so that a search of the product or check at the time of ordering will yield all necessary information.

List of Materials Prohibited from Use in Products

Material groups	
Asbestos	Hydrogen fluoride and its water-soluble salt
Cadmium and its compounds	Beryllium and its compounds
Hexavalent Chromium compounds	PCB's (polychlorinated biphenyls)
Cyanides	Ozone depleting substances
Mercury and its compounds	Halogen fire retardants
Organotin compounds	Specific bromine fire retardants (PBB, PBDE, etc.)
Selenium and its compounds	Polychlorinated naphthalenes (more than three chlorines)
Dioxins	Organic chlorine-based substances
Arsenic and its compounds	PFOS* and its homologs

* PFOS: Perfluorooctane sulfonate
PFOS is an intermediate used to create the final compounds

Results of FY 2004

We evaluated our suppliers on a four-tiered scale of environmental consciousness in FY 2004 and worked with the suppliers that needed to make improvements. As a result, the number of D rank suppliers (those that need to be more environmentally considerate) has decreased. We will continue to work with our suppliers and reduce the environmental burden by integrating the green procurement evaluation results into the supplier quality evaluation.

Suppliers' Environmental Activities Survey Results