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Product Technology Subcommittee

With the widening scope of environmental regulations on products, Toyota Industries is working to develop products with an eye to compliance with future regulatory standards.

The worldwide trend toward stronger environmental regulations on products has made regulatory compliance fundamental to the existence of corporations. As a global manufacturer, Toyota Industries places the utmost priority on environmental concerns in our product development activities while continuing to stress the importance of quality. Furthermore, we are aggressively pursuing the development of technology that enables us to address environmental issues. Despite our involvement in a diverse range of product areas, Toyota Industries is fully committed to incorporating environmental design into all of our products in order to minimize environmental impact throughout the entire product life cycle and to contribute to the sustained growth of society as a whole.

Environmental Design

Incorporating prior environmental assessments at the product development stage

The European Union has taken a leading role in strengthening its environmental regulations of products, and Toyota Industries firmly believes that other countries will follow suit. The Product Technology Subcommittee, which is made up of managers from the company's product development departments, is responsible for monitoring regulatory trends and identifying the impacts on company products in order to determine what product changes need to be made. Environmental regulations on products can range from conventional standards aimed at improving fuel efficiency and achieving cleaner exhaust gas emissions, to regulations on the use of substances of concern and the recycling rate of products. Compliance with these regulations requires the use of environmental assessments and environmental measures throughout the entire product life cycle.

Toyota Industries has acquired ISO 14001 certification for its product development and design departments, with the aim of incorporating environmental measures at the product development stage. In FY 2003, the company established an environmental data processing system that tracks the applicability of environmental regulations for each of its products. Looking forward, Toyota Industries will seek to further improve the recyclability of its products and expand the capabilities of its life cycle assessment (LCA) system*¹, which will enable the company to optimize its environmental assessments covering the entire product life cycle.

Regulatory Trends

Description	2003	2004	2005	2006	2007	2008	2009	2010
EU's end-of-life vehicle (ELV) directive	Enforcement		Tightening		Tightening		Tightening	
Substances of concern	Four substances							
Recycling rate			Certification requirements					
EU waste electrical and electronic equipment (WEEE) directive				Enforcement				
Substances of concern				Six substances				
Recycling rate					Enforcement			
EU regulation on fluorinated greenhouse gases			Expected enforcement					
EU regulation on fluorinated gas leakage			Certification requirements					
EU regulation on fluorinated gas use							Enforcement	
Automobile Recycling Law (Japan)			Full-scale enforcement					

Management of Substances of Concern

Managing and reducing substances of concern in every product

The EU's ELV directive*², which took effect in July 2003, banned the use of lead, mercury, cadmium, and hexavalent chromium in vehicles sold in Europe. Toyota Industries has made a commitment to abandoning the use of these substances, in both its automotive-related products and other products not specifically covered by the ELV directive, as part of a company-wide effort to manage and reduce the use of substances of concern.

Revising Technical Standards

Toyota Industries utilizes in-house technical standards as a key component of its product development and design activities. The company has revised 170 of its in-house technical standards based on the introduction of new environmental legislation regarding substances of concern. These changes are designed to ensure strict regulatory compliance at the product development stage. The revised standards cover everything from surface plating processes to the use of screws, steel sheeting, and other products containing substances of concern.

Reducing Hexavalent Chromium Use

Hexavalent chromium, a substance that prevents rust, will be banned under the EU's ELV directive from July 2007. It can be found in nuts, bolts, and other parts commonly used throughout Toyota Industries' divisions. As part of a company-wide effort to reduce the use of hexavalent chromium, the company conducted a survey of four of its suppliers to determine what preparations have been made to eventually phase out the use of hexavalent chromium. To assess the level of progress in finding substitutes for hexavalent chromium, the company is holding Hexavalent Chromium Special Workshops to increase knowledge and awareness regarding this substance.

*¹ The LCA system assesses the environmental impact of a product throughout its entire life cycle, including the manufacturing, transport, usage, and disposal of the product.

*² The ELV directive was adopted by the European Union to reduce the environmental impact and improve recyclability during the scrapping of used vehicles.

Green Procurement

Forming partnerships with suppliers to procure environmentally friendly products, while prioritizing the procurement of materials with a low environmental impact

Toyota Industries recognizes that it has a critical mandate to reduce its overall impact on the environment by using materials with low environmental impact in order to manufacture, and provide its customers with, environmentally friendly products. To achieve this goal, the company is requesting that its suppliers establish in-house environmental management systems, while managing their use of substances of concern. Toyota Industries is committed to creating a positive partner relationship with its suppliers as a means of promoting green procurement. To assist its suppliers, the company conducts workshops on green procurement and environmental regulations, and arranges on-site visits to monitor the environmental management efforts of its suppliers.

Overview of Activities

Toyota Industries recognizes the increasing emphasis that must be placed on developing environmentally friendly products, and the need to consider the environment in all its procurement activities.

Toyota Industries has adopted environmental standards that govern its procurement from suppliers, in addition to its usual quality, cost, and lead time requirements. These standards are listed in the company's Environmentally Preferable Purchasing Guidelines, which are based on a corporate policy to procure parts and raw materials that have a low environmental impact. Each supplier is required to comply with the guidelines, which state that suppliers must establish an environmental management system and strive to manage and reduce their usage of substances of concern. At the end of FY 2003, 87.5% of suppliers had satisfied the company's requirement of creating their own environmental management system.

Green Procurement Standards

Category		Standards for Green Supplier Certification
Suppliers		Has ISO 14001 certification or meets in-house standards
Substances of concern	Products	Does not contain 19 categories of substances, including heavy metals
	Manufacturing	Does not utilize 457 substances, including organochlorine substances
Other requirements		<ul style="list-style-type: none"> Submission of official corporate commitment to regulatory compliance Reporting of material composition data, etc.

Toyota Industries Procurement Policy

- Fair competition based on an open door policy
- Amicable relationship of mutual benefit based on mutual trust
- Environmentally friendly products based on green procurement
- Localization of business based on good corporate citizenship
- Sound conduct in accordance with the relevant procurement laws

Working Closely with Suppliers

Toyota Industries uses an environmental rating system to assess the quality of the environmental management practiced by its suppliers. In order to assist the suppliers in their efforts to improve their environmental management, the company conducts workshops and other support programs that meet the specific needs of each firm. The workshops cover various subjects including environmental regulations and the establishment of environmental management systems. Furthermore, Toyota Industries works closely with the major suppliers that figure prominently in the company's business activities, conducting on-site inspections of the suppliers' premises aimed at reducing and preventing environmental risks.

Overview of Support Activities

Activity	Scope	Description
Workshops on establishing EMS	Suppliers scheduled to acquire certification	<ul style="list-style-type: none"> Explanation of ISO requirements Discussion of case studies
Seminars on improving EMS	Suppliers seeking to meet standards created by Toyota Industries	<ul style="list-style-type: none"> Explanation of ISO requirements On-site guidance
Workshops on environmental regulations	Major suppliers	<ul style="list-style-type: none"> Explanation of environmental regulations Discussion of regulatory trends

On-site Inspections of Major Suppliers

Toyota Industries conducts on-site inspections of its major suppliers, with a strong emphasis on monitoring the state of regulatory compliance and chemical substance management, and on reducing any environmental risks caused by the suppliers. Should the company identify an area in need of improvement, Toyota Industries then provides the appropriate guidance based on its own experience. Suppliers are then



Seminar on Improving EMS

re-inspected as a means of strict prevention against environmental risks.

Environmental Information System

Establishing a system to assess and comprehensively track substances of concern in raw materials and parts

Toyota Industries uses a large variety of raw materials and parts in order to manufacture its diverse lineup of products. In FY 2003, the company established a new environmental information system that plays a key role in the development of environmentally friendly products. The database system is capable of comprehensively managing environmental information relating to the company's products, including tracking the use of substances of concern in its products. In addition to ensuring regulatory compliance by the company, the system can be used to quickly submit data, regarding the existence of substances of concern in the company's products and parts, at the request of customers. In the future, Toyota Industries will expand the system to cover a wide range of other applications such as determining recycling rates, conducting LCAs, and promoting green procurement.

Overview

Toyota Industries' environmental information system comprehensively tracks substances of concern used in materials and parts handled by the company's main divisions.

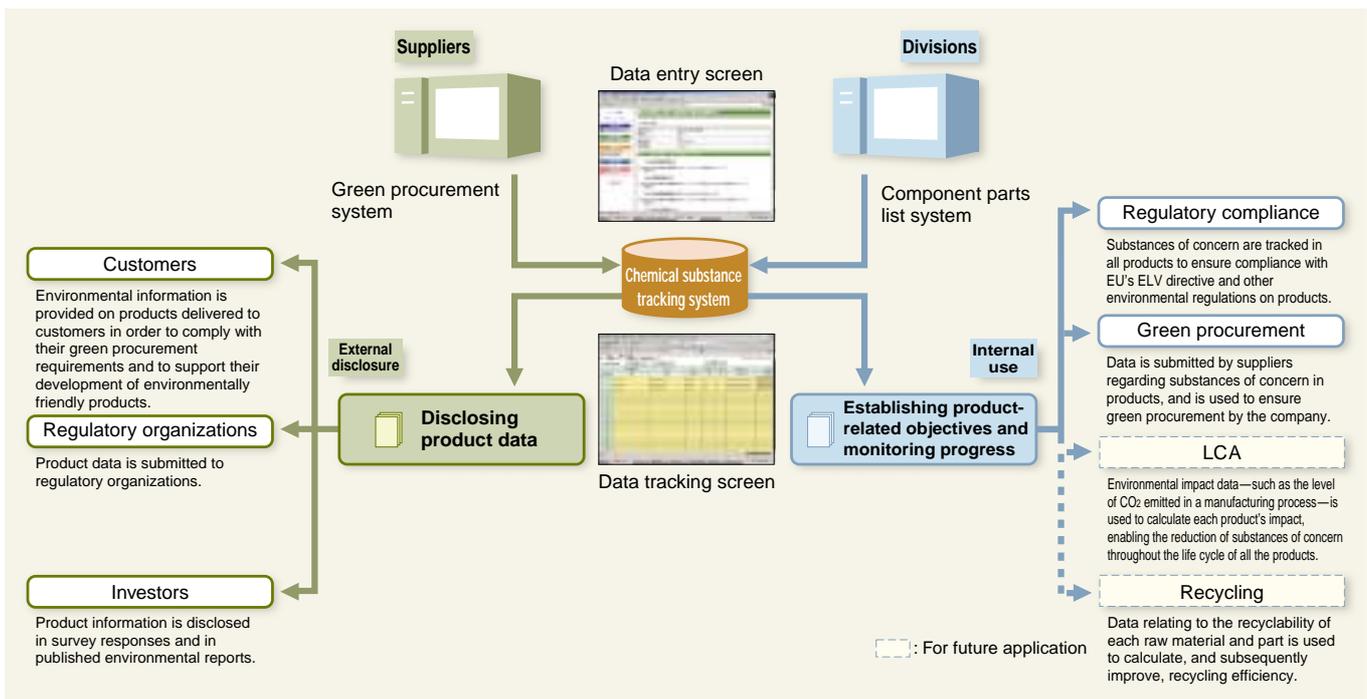
The system helps to ensure that each product complies with the relevant environmental regulations, while also enabling the company to reduce the use of substances of concern in its products by establishing targets and monitoring the process to meet targets. Other advantages of the system include the ability to rapidly retrieve accurate data for submission to the company's customers and other third parties.

The system also contributes to better operating efficiency within the company by allowing data to be shared throughout the company, rather than allowing the data to be managed by individual divisions.

Future Applications

Toyota Industries intends to expand the system's capabilities in the future, such as by adding the ability to track environmental impact data—for example, CO₂ emissions generated during manufacturing and disposal—and enabling the system to track recyclability data. These enhancements will allow the company to accurately and efficiently calculate recycling rates and conduct an LCA for each of its products. The company's overall goal is to create a system that comprehensively tracks all environmental information pertaining to every aspect of product development.

Environmental Information System



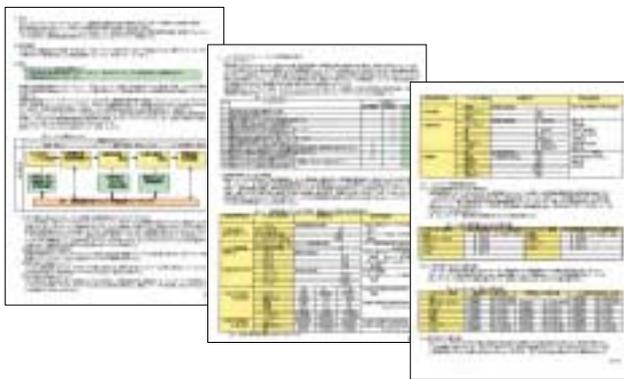
LCA System

Adopting new guidelines to promote the use of the LCA throughout the company

Toyota Industries uses LCAs to determine the environmental impact of its products throughout their entire life cycle, and as a tool for reducing the environmental impact of products. The company is working to perform LCAs for all of its products, based on a new set of in-house guidelines that was established in May 2004.

■ LCA Guidelines

In May 2004, Toyota Industries published a new set of in-house guidelines with the objective of performing LCAs for all of its products. The guidelines are based on previous results of LCAs performed on select products and processes, and contain specific instructions for deriving the environmental impact of a product life cycle and for using the results to reduce the environmental impact of a product. The guidelines will serve as a starting point for expanding the company's application of LCAs, and as part of this effort, the company will utilize its environmental information system to establish specific management items and target values for the initial stage of the product development process.



LCA Guidelines

■ Publicizing Research Results Based on LCAs

In May 2003, Toyota Industries joined other automotive-related firms introducing their newest products and technologies at the Pacifico Yokohama Convention Center in the 2003 JSAE (Society of Automotive Engineers of Japan, Inc.) Automotive Engineering Exposition. During the exposition, Toyota Industries released its research results for an LCA performed on hydraulic fittings that was conducted during FY 2002.



2003 JSAE Automotive Engineering Exposition

Recycling

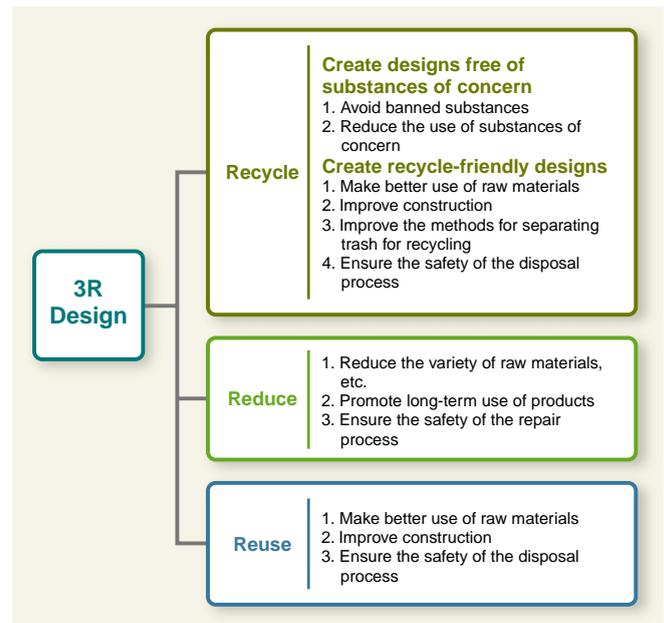
New Toyota Industries 3R Design Guidelines Replace Previous Guidelines

Toyota Industries is firmly committed to applying the 3R concept of "Reduce, Reuse and Recycle" in its product development and design activities in order to contribute to the creation of a recycling-oriented society that efficiently reuses its finite resources.

■ Toyota 3R Design Guidelines

The Toyota 3R Design Guidelines were finalized in April 2004, and now supplant the company's previous guidelines for recyclable designs, which mainly focused on recycling issues. The new guidelines incorporate the 3R concept into the company's product design activities, and include a design checklist for product designers.

■ Major Principles of 3R Design



■ Automotive Wrecking Firms

With Japan's Automobile Recycling Law set to take effect in January 2005, Toyota Industries has continued to conduct field surveys of automotive wrecking firms. These visits enable the company to better grasp how ELVs are being dismantled in the field, and to provide feedback for the company's product development processes. The company visited 11 firms during FY 2003, collecting valuable field data and receiving direct input from the wrecking firms. A report, compiled of the observations made, was utilized to revise in-house technical standards and was relayed to the company's various divisions in order to improve the recyclable designs at the product development stage.

Environmentally Friendly Products

■ Automobile ■

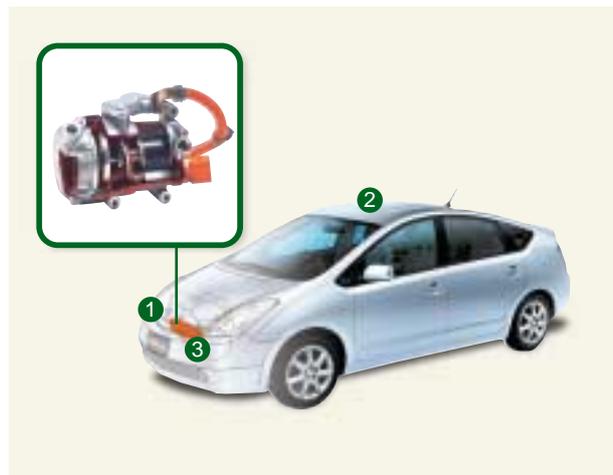
Toyota Industries develops and manufactures engines and car air-conditioning compressors, both major components of automobiles. The company's product development efforts are aimed at addressing the increasingly strict environment regulations placed on automobiles, including the need for improved fuel efficiency, cleaner exhaust gas emissions, and elimination of fluorinated gases.

■ ES18 Electric Compressor ①

The ES18 electric compressor was developed for the air-conditioning system of the latest version of the Prius, and is the world's first mass-produced electric compressor. By using a battery power source, the compressor continues to provide cooling even when the Prius engine is shut off, while idling or when stationary. This feature contributes to the overall comfort of the Prius vehicle. The new compressor is also smaller, lighter, contributes more efficiently to improved fuel efficiency, and produces less vibration.

■ Upper Body for New Toyota Prius ②

The latest version of the Toyota Prius hybrid vehicle, manufactured and sold by Toyota Motors Corporation, utilizes a new upper body developed by Toyota Industries. The upper body is significantly lighter than its predecessor and contributes to improved fuel efficiency, while also meeting the strictest collision safety standards in numerous countries.



■ Electronics ■

Toyota Industries develops electronic products that meet the increasingly diversified needs of the automobile industry, such as DC-DC converters. These products are based on the company's power electronics technology developed for its battery-powered forklift trucks. Toyota Industries is also working on the development of a low-power LCD.

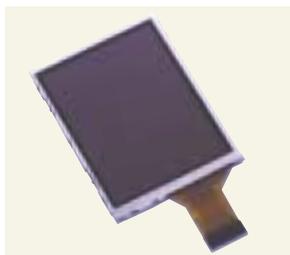
■ Strip Light with Organic Light Emitting Diode (OLED)* Device Technology

In collaboration with the Japan Broadcasting Corporation (NHK), Toyota Industries developed a strip light fixture for film stages that use OLED devices. Compared with conventional fluorescent lighting fixtures, the strip lights consume less power, while eliminating heat generated from the light source.



■ LCD

ST Liquid Crystal Display Corp., an affiliate of Toyota Industries, manufactures high quality, high resolution LCDs for use in video camcorders and other applications. These products offer high reliability and low power consumption.



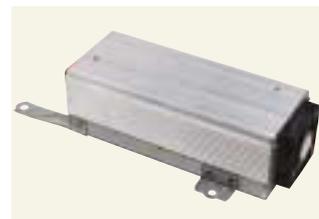
■ DC-DC Converter (See ③ in illustration above)

Toyota Industries' DC-DC converter, installed in the Prius as a key device of the hybrid car, converts the high voltage current of the main battery to a lower DC current that is supplied to the electric control unit (ECU), stereo, car navigation systems, and other in-car devices.



■ 1.5 kW DC-AC Inverter for Hybrid Vehicles

The DC-AC inverter changes direct current (DC) from the special battery of a hybrid car into an alternating current (AC), allowing for a wider range of high-consumption electrical appliances, such as microwave ovens, to be used in the vehicles.



*OLED: a material that produces direct light emission by impressing a voltage on a thin film comprised of emissive organic compounds, and which has been inserted between two electrodes. OLED displays are expected to lead the way for the next generation of displays.

■ Industrial Equipment ■

Toyota Industries develops and manufactures a full line of forklift trucks ranging in capacity from 0.5 to more than 40 tons, as well as other industrial vehicles such as wheel loaders and tow tractors. The company places an emphasis on improving worker safety and the environmental performance of its industrial vehicles, and is focused on developing engines that produce cleaner emissions and on improving the performance of its electric vehicles.

■ 14Z Engine for 5 to 8-Ton-Capacity Forklift Trucks

Toyota Industries recently introduced a new version of its 14Z direct injection diesel engine used in the company's 5 to 8-ton-capacity forklift trucks. The revised engine meets 2003 exhaust gas regulations for special vehicles in Japan and generates lower NOx, hydrocarbon, and particulate matter emissions.



■ 4SDT

Toyota Industries recently updated its line of 4SDTs, which are typically used for jobs such as snow removal and crop transport. The new products meet the exhaust gas regulations and new noise standards issued by Japan's Ministry of Land, Infrastructure and Transport for construction equipment.



■ Vector C15 Very Narrow Aisle Truck (BT Industries)

In 2003, BT Industries, a subsidiary of Toyota Industries that develops and manufactures warehouse trucks, released a new version of its BT Vector C15 truck model. The updated model features several environmentally friendly enhancements, including an energy saving AC motor and an ultra-efficient energy regeneration system*. The company is also intent on reducing the amount of substances of concern used in the production of the vehicle. For example, capacitors containing hexavalent chromium and cadmium have been phased out from production.



■ Textile Machinery ■

Toyota Industries develops and manufactures weaving and spinning machinery for the textile industry. The company is focusing its environmental efforts on actively incorporating control technology, communication technology, and mechatronics in its textile machinery in order to reduce energy consumption, noise, and vibration in its products.

■ Roving Frame

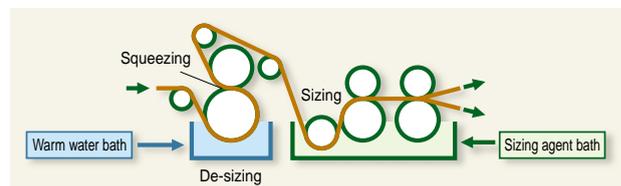
Toyota Industries has reduced its use of lead in its roving frame machinery. Lead was previously used to perform balance adjustments for the high-speed rotating flyer system in roving frame machinery, but is steadily being replaced with a substitute material.



■ Pre-wetting System (Kawamoto System Corporation)

Kawamoto System Corporation, a subsidiary of Toyota Industries, has developed a new sizing machine that offers improved yarn strength and a pre-wetting system for spun yarn. Sizing agent consumption has been reduced by up to 40% by switching to a process in which sizing is performed after exposing the yarn to a warm water bath, which leads to greater uniformity in the sizing agent application. This also reduces the amount of sizing agent removed after weaving, which results in less industrial waste.

■ New Sizing Machine



*The regeneration system efficiently stores energy, from braking, in the vehicle's battery.