

Response to European ELV Directives

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1 Introduction

In industrial circles, we have entered an era where global business activities are expected, with procurement, production and sales implemented in various countries. However, amidst fears of environmental degradation on a global scale, laws and regulations are appearing that will have profound effects on manufacturing in the future.

This article describes the effects on automotive-related industries and the home appliance industry of globally trend-setting European laws and regulations, and our company's response to these.

2 Trends in European Environmental Regulations and Their Effects on Related Industries

In Europe, the average citizen's sense of crisis regarding the environment is high relative to that in other countries, and European laws and regulations have set global trends. Currently other countries are improving their own domestic laws with an eye to trends in European regulations.

The most startling trends recently are the directives related to ELV (End of Life Vehicle) and WEEE (Waste From Electrical and Electronic Equipment). The automotive-related industries and home appliance industries are being called on to reflect a new concept of values in business activities, i.e. "QCDE (Environment)", adding environmental friendliness to the heretofore "Manufacturing Base = QCDE".

The Japan Automobile Manufacturers Association (JAMA) has accepted the European ELV directives, and has announced that it is establishing equivalent voluntary regulations, making a start to voluntarily address these issues.

Also, various automotive manufacturers in Japan automotive manufacturers have independently set production commencement objectives for products in compliance with European ELV directives, encouraging a response from the parts industry, utilizing this situation proactively as an opportunity for share expansion with respect to these regulations.

3 Overview of European ELV Directives

This section begins with a description of automotive-related environmental regulations and the "European

ELV Directives" published in October 2000.

ELV is an abbreviation for End of Life Vehicle. These regulations were established with the objective of preventing vehicles that are no longer being used from having a negative impact on the environment. Specifically, it consists of two parts - hazardous substance usage regulations and regulations involving recycling ratios.

These regulations apply to new vehicles sold from July 1 2003. Automotive manufacturers are obligated to strictly comply with the following regulations.

3.1 Recycling Regulations Overview

Recycling regulations are one component of the content of the European ELV. They consist of two types - the recyclable ratio and the recycling implementation ratio. The recyclable ratio is the portion of vehicle weight for which there is a possibility of recycling (theoretical value). The recycling implementation ratio is the portion of weight actually recycled by the automobile manufacturer from vehicles taken back. (See Figure 1).

Under the recyclable ratio regulations, the automobile manufacturer must calculate and disclose the recyclable ratio for each vehicle at the time of vehicle type-approval, and must certify and receive approval that the value is equal to or greater than the recyclable ratio objectives. Also, with respect to the recycling implementation ratio regulations, the automobile manufacturer is obligated to certify, with data from the taking back and recycling of used vehicles as proof, that the recycling

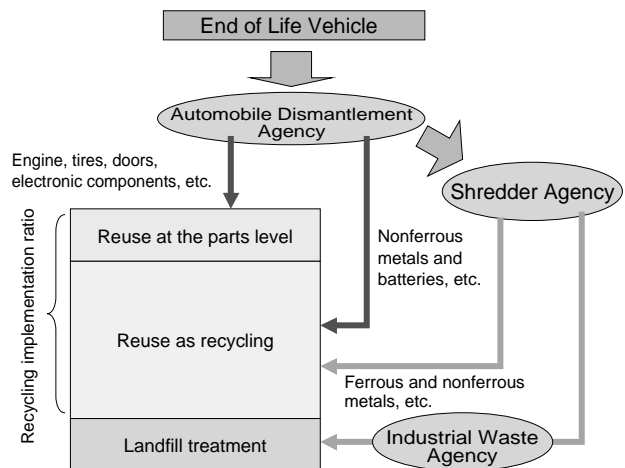


Fig.1 Parts and materials targeted for recycling and those not targeted for recycling

implementation ratio objectives have been achieved or surpassed.

Further, under the concept of normal recycling (material recycling), objective values are established for recycling ratios (so-called recovery ratios) including thermal recycling.

In actuality, the regulations are implemented in stages; Figure 2 shows the regulation start time and the details of the regulations.

2000	2005	2006	2010	2015
			Recovery implementation ratio → 95% or more	
			Recycling implementation ratio → 85% or more	
			Recoverability: 95% or more	
			Recyclable ratio: 85% or more	

Fig.2 Schedule for the implementation of recycling ratio regulations

3.2 Overview of hazardous Substance Use Regulations

What are referred to here as hazardous substances consist of four substances:

Lead, cadmium, hexavalent chromium, and mercury

Use of these hazardous substances is in principle forbidden as of July 2003. However, exclusions to the rules have been established depending on the existence of replacement techniques. In some cases regulation periods have been delayed and or not determined depend-

		ELV regulation periods				
	Parts including the substance	2003	2004	2005	2006	2007
Lead	PVC (wire covers, tubes, electronic condenser sleeves) terne-coated sheets, coating agents	July				
	Glass from glass bulbs			January		
	Aluminum for mechanical processing (1 < lead 2%)			July	(Lead 1% is regulated beginning in July 2008.)	
	Solder			Regulation period yet to be determined		
Cadmium	Motor rectifiers, fuses, contact pigment, nickel cadmium batteries	July				
	Thick film paste				July	
Hexavalent chromium	Chromate treatment					July
Mercury	LCD backlights			Regulation period yet to be determined		

Fig.3 Schedule for the elimination of hazardous substances based on ELV directives

Table 1 Regulation period for ELV directives on hazardous substances

Example of items for which use is prohibited from July 2003	Reference
• Lead, except for use for which exception regulations are established	(Applicable at our company: PVC lead, terne-coated sheet lead)
• Cadmium, except for use for which exception regulations are established	(Applicable at our company: Cadmium in motor rectifiers)
• Hexavalent chromium, except for use for which exception regulations are established	(Not applicable at our company)
• Mercury, except for use for which exception regulations are established	(Not applicable at our company)
Example of items for which the regulation period has been postponed	
• [Regulations exception] Lead in lamp glass	Use prohibited from January 2006 (Applicable at our company: lead in glass bulbs)
• [Regulations exception] Cadmium in thick film paste	Use prohibited from July 2007 (Applicable at our company: electronic parts etc.)
• [Regulations exception] Hexavalent chromium for rust protection	Use prohibited from July 2008 (Applicable at our company: zinc-plated steel plates)
• [Regulations exception] Aluminum lead (Lead 1%)	July prohibited from July 2009
Example of items for which the regulation period is yet to be determined	
• [Regulations exception] Batteries, solder in electronic substrates (board) and other electronic parts, lead in glass and ceramic boards	
• [Regulations exception] Discharge lamps, mercury in measurement panel displays	

ing on use application.

Regulation periods settled at the present stage are as shown below. (See Figure 3).

4 Response by Automotive Manufacturers

In this section as a background to the European ELV directives, trends and response issues by automobile manufacturers will be examined.

4.1 Regulation Compliance Certification (Non-inclusion of Targeted hazardous Substances and Clearing of the Recycling Ratio Objectives)

As shown in Figures 1 and 2, hazardous substance regulations begin from July 2003, while recycling and recovery possibility ratio regulations begin from July 2005. In order for automotive manufacturers to certify compliance with both regulations, collation of an enormous amount of parts information and a complicated confirmation system are necessary. Were the various automobile manufacturers to independently develop systems with these objectives in mind, there would not only be variations in the information disclosure request specifications sent to parts manufacturers for parts information confirmation, inviting confusion within the parts industry, but also considerable expenses borne for development and maintenance of ostensibly equivalent systems.

For this reason, the principle automotive manufacturers in various countries have reached an agreement, creating a system that makes it possible for the automotive manufacturers throughout the world to collate and confirm environmental information for the parts comprising their vehicles using the same forms and with an equivalent burden.

This system known as IMDS*1 is as described above, and was established by the 8 principle American and European automotive manufacturers in conjunction with

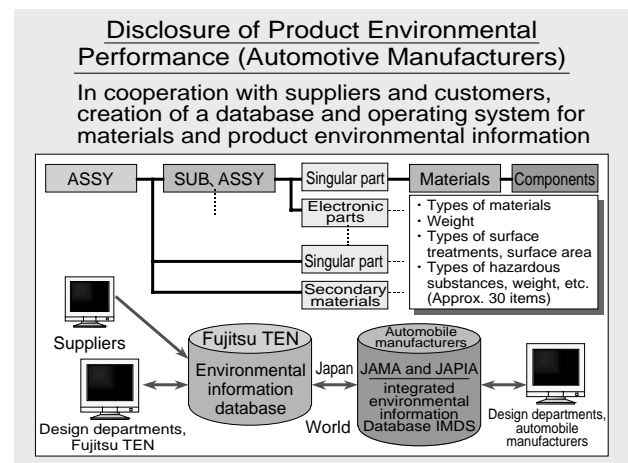


Fig.4 Environmental information collection system concept

* 1 IMDS : International Material Data System

EDS, the company providing development and operation of the system. The total number of users including automotive manufacturers professing use of the system has risen to approximately 14,500 companies (as of March 2003). The next section will provide an overview of the system. (See Figure 4).

Each parts manufacturer accesses the IMDS website online, and enters the destination to which their data is presented.

Each of the automotive manufacturers specified as recipients of the data download to their in-house system the parts environmental data that was entered. This makes possible the in-house creation of data, including recyclable ratio tabulations based on materials information, and confirmation of hazardous substance and materials information. The resulting data is used to certify compliance with the regulations. Entry request details were issued from JAMA as well in March 2003.

Already at our company as well, a number of automotive manufacturers have requested that we begin information presentation from July 2003 to comply with the above-mentioned system.

4.2 Measures for the Elimination of hazardous Substances Targeted by the Regulations

For regulations with their periods settled, the various automotive manufacturers are submitting requests to the parts manufactures approximately one year before the start of the regulations that hazardous substances targeted by the regulations to be eliminated from parts comprising the vehicles.

In response, preparation is important for parts manufacturers at an early stage so that conditions regarding the inclusion of hazardous substances targeted by the

regulations can be investigated in advance and that elimination can be effected in the period requested by the various automotive manufacturers.

Even for regulations periods that have not yet been settled, as regulation periods are set in accordance with the establishment of techniques in industry, investigation and discussion are necessary while keeping a close watch on technical trends.

The elimination of lead, for example, is one aspect of the response by domestic automotive manufacturers (such as TOYOTA Motors CORP.) to hazardous substances targeted by the regulations.

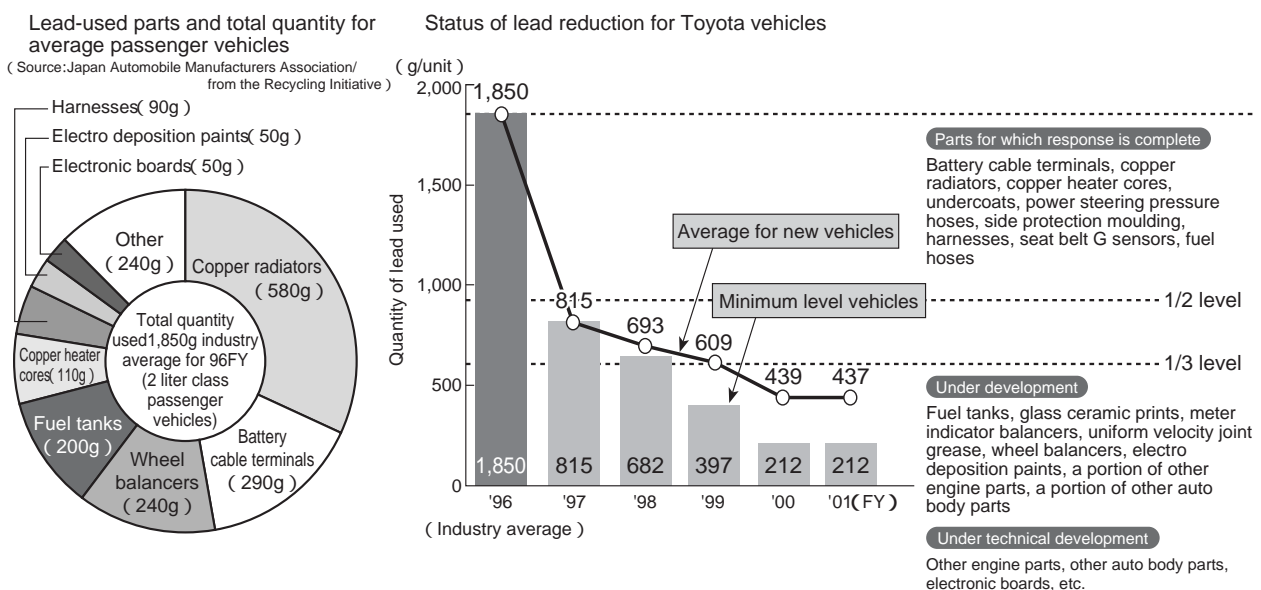
To this point, lead has been eliminated from radiators, battery cable terminals and wheel balancers, reducing the amount to about 1/4. In order to achieve a level to 1/10 in future, lead must be eliminated from electronic boards, a measure which has not been taken to this point. (Refer to Figure 5.)

5 Responsive at Fujitsu Ten

5.1 Regulation Compliance Certification (Presentation of Product Environmental Information to "IMDS")

5.1.1 Results of Measures Implemented in FY 2002

In order to implement presentation of product environmental information to IMDS in conformity with requests from automotive manufacturers, entry is necessary of materials information (approx. 30 items) for the component parts comprising the products delivered. For full-featured products, this involves complicated manual tabulation of information for about 1,500 parts. When all products are targeted, a tremendous number of man-hours will result.



From the Toyota Motor Corporation "Environmental Report, 2000 and 2002 editions"

Fig.5 State of lead reduction for automobile manufacturer (Toyota Motor Corporation)

A tabulation system for product environmental information was created in order to keep the man-hours for data entry to a minimum and to implement data tabulation in a short time. Full-scale operations are scheduled to begin in the first half of 2003. Regarding collation of parts materials information, the basis for product environmental information, investigations were implemented with suppliers on more than 30,000 preexisting parts. Regarding newly procured parts, in order to smoothly acquire materials information, there has been collaboration between the design departments, technical administration departments and procurement departments, and a system is being created that allows procurement bases throughout the world to comprehensively implement recovery management and follow-up reminder for parts investigations.

Parts Materials Information Investigation

- Collation begins of materials information for all new parts (December 1, 2002)
- Wholesale investigation with all suppliers of materials information for preexisting parts (Investigations beginning in November 2002)
- Recovery of materials information investigation (As of March 2003): investigation recovery rate of 50%

5.1.2 Future Issues

It is not likely that ELV directives will remain limited to only 4 substances. Regulations with respect to hazardous substances will no doubt be strengthened in the future.

It is believed that reconciling risk avoidance for hazardous substance regulations with design efficiency, and using this to advantage in business will be important issues in future.

For this reason, regarding parts and materials whose adoption is discussed at the product design stage, it is necessary that confirmation of materials information can be implemented immediately. Construction of a database for materials information in the materials and parts business world, as well as of a network for presentation of this information to buyers is indispensable for the acquisition of materials information in a short period. Work is underway on the "ECALS" parts information database at the Japan Electronics and Information Technology Industries Association (JEITA), and much is expected of this project.

From the point of view of those receiving this information, including our company, as work must proceed on any number of fronts in order to ensure inclusion of the requested details, announcements at conferences with those concerned, exchange of opinions and other efforts are being proactively implemented.

Reference

Background to the Required Collaboration with the Home Appliance Industry

In Europe, with respect to home appliances as well, environmental regulations known as the "WEEE*2 directives" and "ROHS*3 directives" are being developed.

The WEEE directives deal with recycling ratio regulations and the ROHS directives with hazardous substance regulations, details of which bear a striking resemblance to those of the ELV directives. The regulations will begin from July 2006. Accordingly, the same type of measures required of the home appliance industry for compliance is being undertaken by the automotive industry. It is thus necessary that the home appliance industry and the automotive industry coordinate similar requests they make to the parts manufacturers.

5.2 Measures for the Elimination of hazardous Substances Targeted by the Regulations

A hazardous substance use elimination schedule (see Figure 6) was established at our company in order to respond to the requests of automotive manufacturers.

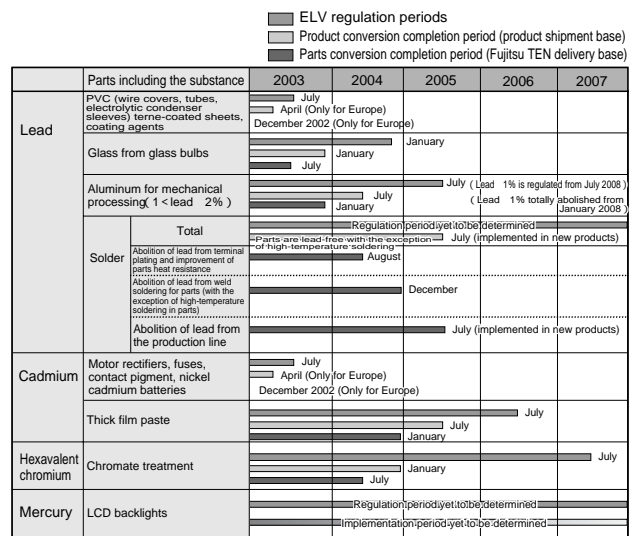


Fig.6 Schedule for the elimination of hazardous substances at our company

5.2.1 Results of Measures Implemented in FY 2002

Elimination of Lead and Cadmium from Parts

In response to the July 2003 regulations, regarding the approximately 150 products containing prohibited substances, design changes were implemented in cooperation with parts manufacturers, switch-over was completed to compliant products in accordance with objectives, and delivery of compliant products began in May.

Lead-Free Welding Solder

With respect to the "reflow soldering process" using solder paste, technical measures were established for the adoption of lead-free solder. These were applied to the main boards for 2002 model commercial products (AVN), and the goods were placed on the market.

The features of lead-free solder in comparison with lead solder are given below. In particular, as products at our company (in-vehicle devices) are used in severe environments with respect to vibration, temperature

* 2 WEEE : Waste Electrical and Electric Equipment

* 3 RoHS : Restriction on Hazardous Substances

and humidity in comparison with home appliances, establishment of techniques is being pursued very carefully.

- Solder melt temperature is high (tin/lead alloys 180 tin/silver/copper alloys 220): parts heat resistance
- Degradation of solder wetability: weld reliability
- Composition of terminal plating for parts that are soldered is easily influenced: weld reliability

Application of lead-free solder is planned for all soldering processes for new products coming off the line from July 2005.

Hexavalent Chromium-Free Parts

Requests have been presented for replacement parts to various manufacturers of steel plating, screws and other products for which surface treatment is applied including hexavalent chromium to obtain rust protection. Evaluation has been completed within the materials and parts base.

With respect to parts used at our company, response is on the whole possible using the following replacement materials and with the adoption of the following techniques.

- Electro galvanized plated steel plating (hexavalent chromate film resin film or trivalent chromate film)
- Screws and other post-plating treated parts (plating treatment including hexavalent chromium plating treatment including trivalent chromium)

For this reason, complete elimination of hexavalent chromium by the end of 2004 has been set as an objective. In response to this, in various design departments, discussions are underway regarding the evaluation of formation results, assembly conditions etc. for the product base, including effects due to background noise and screw "fastening torque", caused by differences in surface treatment materials and by changes in the coefficient of friction. Adoption of hexavalent chromium-free parts has also begun in part for newly designed products.

Mercury-Free Parts (Display Backlights)

Evaluation of the technical performance of replacement parts (Xenon, LED, organic EL) has been completed, and plans are underway for the marketing of products adopting mercury-free backlighting by FY 2005.

5.2.2 Future Issues

Regarding the elimination of lead from weld solder, a central issue is the strengthening of cooperation between related departments, to allow a broad array of activities to advance logically. These activities include the establishment of techniques for the combination of reflow soldering with other applicable processes, design in response to the elimination of lead from all new products implemented following the establishing of techniques for all processes. They also include parts measures promotion follow-up with suppliers, production preparation (facilities improvements), support and follow-up for the establishment of machining outsourcer techniques, and improvements to the after-service system (thoroughness of repair standards).

6

Conclusion

In order to contribute to global environmental protection, we are presenting green products in a timely manner as befits a global player. The Fujitsu TEN group as a whole is also making efforts to improve product environmental information and to disclose it to our customers so that they are able to use our products with peace of mind.

Profiles of Writers



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Entered the company in 1972. Since then, has been involved in general affairs, plant management and environmental management. Currently the Manager of the Environmental Protection Department.



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Entered the company in 1981. Since then, has worked in the car stereo design department, business affairs department, and service department and is now involved in product environmental information management. Currently in the Environmental Protection Department.



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