

Reducing the Use of Hazardous Substances

Overall Approach

DENSO's Product Recycling Subcommittee directs DENSO's efforts to eliminate the use of substances that impact human health and the ecosystem, such as asbestos, cadmium, hexavalent chromium, mercury, and lead.

There are various chemical compounds that can be hazardous to the environment. DENSO not only complies with environmental regulations in Japan and overseas but also takes a holistic approach covering materials procurement, design, and manufacturing. The Company is also working to reduce the use of other hazardous substances that are not regulated.

Hazardous substances that DENSO has reduced or eliminated its use of include asbestos, cadmium, hexavalent chromium, mercury, and lead. Asbestos, which has been labeled a carcinogen, had been used in plastic products as a reinforcer, but DENSO has not used this substance since the late 1980s.

In addition, cadmium was used in relay contact points. With a few exceptions, it has been replaced with alternative substances. We are now replacing its use in all areas.

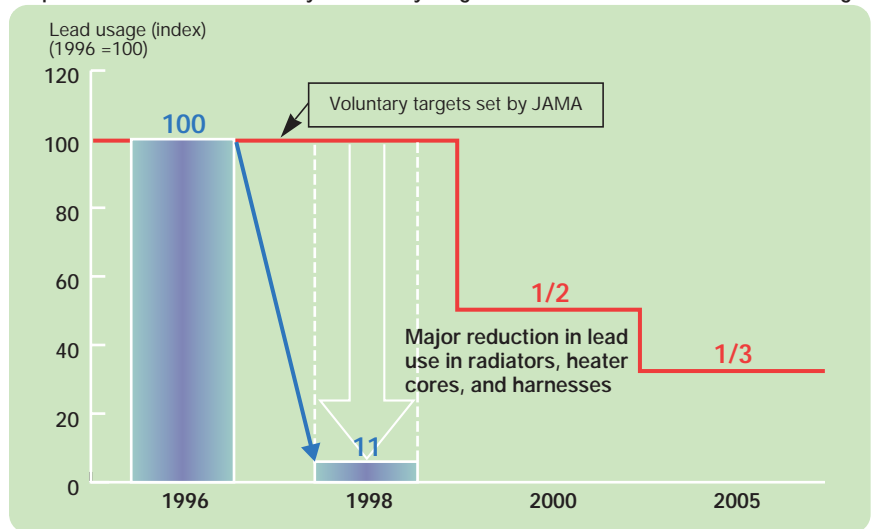
Hexavalent chromium is used as a plating material in finishing processes and mercury as a backlight for automotive meters. DENSO is currently

developing safe alternatives to replace these substances.

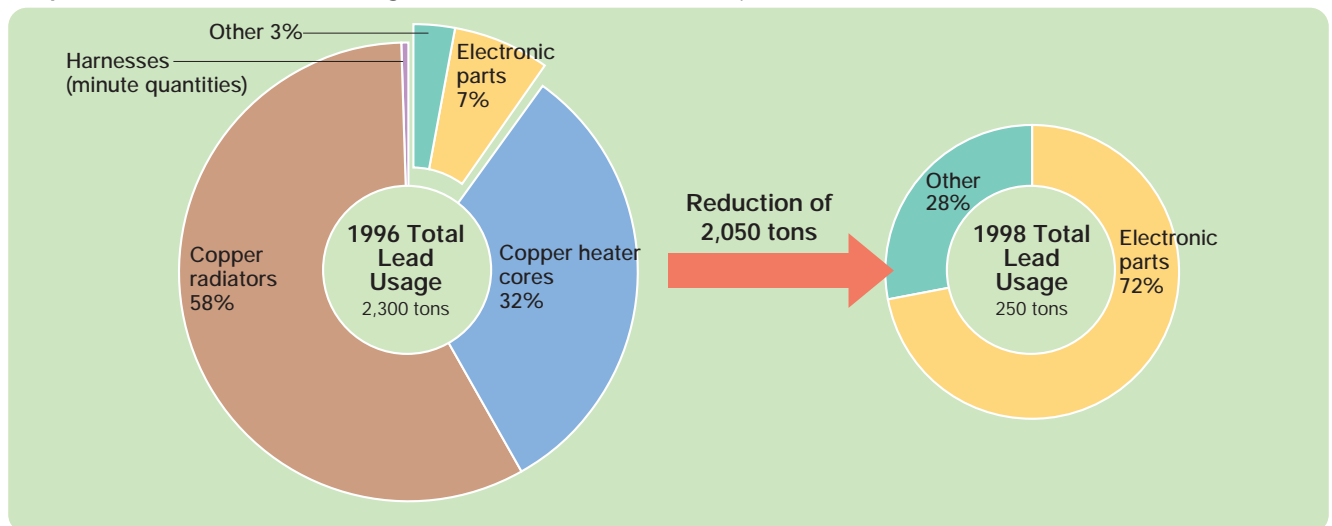
Reducing the Use of Lead

Lead has been drawing the most attention among substances that impact the environment. In January 1998, the Japan Automobile Manufacturers Association (JAMA) published its *Voluntary Action*

Graph 1: The Automotive Industry's Voluntary Targets and DENSO's Reduction in Lead Usage



Graph 2: Breakdown of Lead Usage at DENSO (lead and lead compounds)



Plan for the Initiative of Recycling End-of-Life Automobiles, which includes voluntary targets for the industry to “reduce the amount of lead used in new vehicles to roughly less than half the 1996 level by the end of 2000 and to roughly less than a third of the 1996 level by the end of 2005.” (See Graph 1, page 16.)

DENSO automotive components that contain lead included copper radiators, copper heater cores, and printed wiring boards. (See Graph 2, page 16, and Figure 1 below.) Regarding copper radiators and heater cores, the Company has replaced the body material with aluminum (see photograph below) and replaced lead solder with a lead-free wax material, thus reducing lead usage 2,050 tons per year. In addition, DENSO had used lead compounds as a stabilizer for the polyvinyl chloride that goes into the

insulation covering of its harnesses but now uses alternative materials in cooperation with its suppliers.

By applying such technologies, DENSO has significantly exceeded industrywide targets and will continue to achieve its own stricter objectives.

Future Approach

DENSO will keep close surveillance on the chemicals it uses and will work on chemical restrictions ahead of the introduction of legal regulations. In particular, the Company commits itself to the ongoing development of alternatives to lead.

Products that still contain lead include solder for printed wiring boards, which are automotive components that require exceptionally high standards for reliability. In the search for a replacement for lead solder in automotive

printed wiring boards, DENSO evaluated tin, silver, copper, zinc, bismuth, and other alloys for their wettability and strength.

As a result, the Company determined that Sn-Ag-X (Cu and other) compounds are suitable for automotive applications and is proceeding with technological development using these compounds.

Figure 1: Use of Lead Parts in DENSO Products and Status of Reduction

Part Name		1996	1998
Copper Radiators		In use	Completely eliminated
Copper Heater Cores		In use	Completely eliminated
Printed Wiring Boards		In use	Developing technologies
Harnesses		In use	Completely eliminated
Others	Electrodeposition Coating	In use	Developing technologies
	Steel	In use	Developing technologies
	Electrical Parts	In use	Under consideration
	Other Parts	In use	Under consideration

Lead-Free Aluminum Radiator

