

Governor's Pollution Prevention Award, 1999 Recipient **Lear Corporation, Wauseon Facility**

The Governor's Awards for Outstanding Achievement in Pollution Prevention have been presented annually since 1986. Lear Corporation, Wauseon Facility, was one of nine recipients to receive the award in 1999. These awards recognize outstanding commitments to improve Ohio's environment through pollution prevention. Evaluation criteria for the awards include: the reduction of waste at the source, recycling or recovery of materials, cost-effectiveness, ability of the program to serve as a model for others, and effectiveness in promoting pollution prevention as the preferred long-term approach for environmental management.

Lear Corporation, Wauseon Facility

Lear Corporation's, Wauseon Facility, (Lear) is a world-class manufacturer of automotive interior door trim panels and sun visors. Lear currently employs more than 400 associates.

Pollution Prevention Project Description

Lear's manufacturing process of interior door trim panels for a major automobile manufacturer originally included the use of solvent-based adhesives. These solvent-based adhesives worked extremely well, providing excellent adhesion and quick drying. Lear was aware that water-based adhesives had been greatly improved through the years and had a desirable adhesion quality similar to solvent adhesives.



Lear Corporation's Wauseon Facility is recognized for:

- **implementing process and material improvements to the manufacturing process to minimize waste of any adhesive material used in producing interior door panels;**
- **reducing air emissions by 87 percent and the amount of hazardous waste disposed by 95 percent;**
- **reducing hazardous waste disposal costs by more than 90 percent;**
- **eliminating employees' exposure to methyl ethyl ketone, toluene, hexane and other potentially harmful solvents; and**
- **saving more than \$100,000 in raw material expenses alone.**

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Water-based adhesives also have a tremendous benefit of a much lower volatile organic chemical (VOC) content.

A switch to water-based adhesives meant a reduction in air emissions and hazardous waste generation, as well as improved worker health and safety—outcomes the management of Lear strongly supported.

Low VOC adhesives in model-year changeover

In 1996, Lear asked its engineers to implement a pollution prevention project intended to address and decrease the volume of waste generated by its use of solvent-based adhesives. Lear engineers focused on including low VOC adhesives and other technologies

into aspects of the upcoming model-year changeover, which occurred in July 1997, for their major automobile manufacturer customer.

Lear engineers worked with adhesive suppliers and conducted trials of various water-based adhesives, looking for the material that would perform as well, if not better than the

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Environmental Benefits

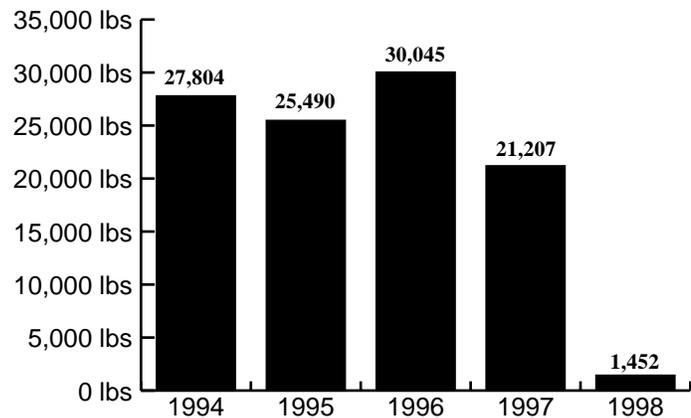
Lear's switch to a water-based adhesive in their interior door trim panels and process improvements produced major reductions in air emissions and hazardous waste. Air emission VOCs were measured at 67,525 pounds in 1996 and in 1998 were 8,278 pounds. This was a reduction of 87.7 percent.

Lear has changed its status from a large quantity generator to a conditionally exempt small quantity generator. In 1996, Lear generated 30,045 pounds of hazardous waste. After adhesive and process changes, the amount of hazardous waste in 1998 was 1,452 pounds. This was a 95.2 percent reduction.

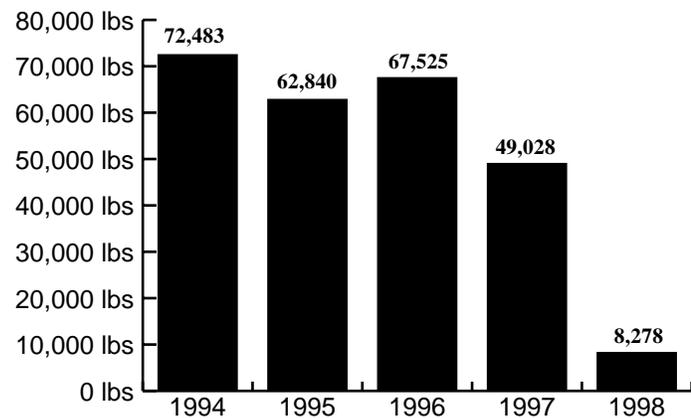
Lear's Toxic Release Inventory (TRI) numbers from the wood fiber line (part of door panel line) in 1996-98 were as follows:

	MEK	Toluene	n-Hexane
1996	44,000 lbs.	13,500 lbs.	10,500 lbs.
1997	22,000 lbs.	0 lbs.	0 lbs.
1998	no TRI releases from wood fiber line		

Hazardous Waste Disposal Trend (pounds)



Air Emissions Trend (pounds)



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solvent-based adhesives currently in use. They successfully located material with a VOC content of less than 15 percent. This material also passed the end-customer's quality, engineering and environmental specifications.

Improvements to manufacturing process

Lear focused on how to best apply the new adhesive to the manufacturing process. Adhesives are used to apply vinyl to wood, metal and styrofoam. Previously, all adhesives were applied manually in one of 14 spray booths. Improvements were made to reduce emissions and waste, as well as to cut costs and improve quality by reducing over spray and material waste. Two Fanuc robots were installed to start the new line followed by four semi-automated spray booths, allowing for an accurate and consistent application of the new water-based adhesive to each door panel. Additional process improvements, including consolidation of operations, eliminated the other eight spray booths.

Lear also relied on "Kaizan Teams," continuous improvement groups, to identify and develop specific line design and layout changes.

The implementation of the change from solvent to water-based adhesives began in July 1997, with the model-year changeover. During 1997, it took approximately six months to refine the process and changes. Therefore, the first full year of low VOC water-based adhesive usage was achieved in 1998.

Health and Safety Benefits

Employee health and safety have been greatly improved by the adhesive changes as well. Although Lear did not encounter any issues of overexposure, employees are no longer at risk of being exposed to methyl ethyl ketone (MEK), toluene, hexane and other potentially harmful solvents found in the previously used solvent-based adhesives.

In addition, due to the fact that many of Lear's processes involve heated materials and equipment, the switch to a water-based adhesive also improves employee safety, since the adhesive is not as highly flammable as the previously used solvent-based material. Lear also eliminated industrial hygiene monitoring for VOCs.

Management Commitment

Pollution prevention is encouraged throughout Lear's Wauseon facility, which encouraged its engineers and business unit manager to focus on the solvent-based adhesive process because of its waste generating magnitude.

Not only did the change require an internal management commitment, but it required customer commitment as well. Without this commitment, the project would not have been a success.

Once the conversion from solvent to water-based adhesive was fully implemented, the entire facility was notified of the improvements.

Management commitment was highlighted again in 1998 when Lear management challenged engineers to find a water-based adhesive with an even lower VOC content than the less than 15 percent VOC water-based adhesive introduced in July 1997. Engineers worked with adhesive suppliers and began testing a water-based adhesive with a VOC content lower than five percent. By December 1998, all tests had been completed and passed the end-customer's quality, engineering and environmental criteria.

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Production lines were converted to a water-based adhesive with a VOC content less than five percent in March 1999.

Transferability

The success of Lear's use of water-based adhesives was shared with the automobile manufacturer for whom Lear produces the door panels involved in the project. This customer's positive acceptance of the change was critical to making a positive environmental, human health and safety and economic impact.

The improvements also were shared with other environmental, health and safety professionals within the Lear corporation.

Economic Benefits

Although it is difficult to fully account for the cost avoidance associated with this pollution prevention effort due to the complete changeover of the

process (including machinery and laborers), by comparing 1996 figures to 1998 figures, raw material savings alone was greater than \$100,000.

The water-based adhesives utilized in this process cost more than the solvent-based counterparts, however, Lear actually uses fewer adhesives due to more accurate application and the elimination of waste from expired material. The solvent-based adhesive previously used had a shelf-life of merely hours once mixed and unused portions had to then be disposed as hazardous waste. The water-based adhesive has a self-life of 60 days and need not be disposed as hazardous waste. This cost savings was somewhat offset due to machine and equipment purchases necessary to set up the new door panel line.

As a result of using less adhesives and minimizing process waste, Lear's hazardous waste disposal costs dropped from approximately \$20,000 per year

to less than \$1,500 per year. This is a savings of more than 90 percent.

Also, Lear appreciated financial savings related to labor cost. The solvent-based adhesive previously used needed to be mixed, the waste managed, and the process lines flushed with MEK. On average, 12 labor hours were spent daily managing the glue pots for all the spray booths. The switch to a water-based adhesive resulted in a cost savings of \$40,000 per year in labor costs.

For more information

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The Office of Pollution Prevention was created to encourage multi-media pollution prevention activities in Ohio to reduce risk to public health, safety, welfare and the environment. Pollution prevention stresses source reduction and, as a second choice, environmentally sound recycling while avoiding cross media transfers. The Office develops information related to pollution prevention, increases awareness of pollution prevention opportunities, and can offer technical assistance to business, government, and the public.



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