

# ● Creating Easy to Recycle Cars

The concept of recycling resources in manufacturing cars is important in meeting our responsibilities to the environment. Mazda is pressing ahead with adopting more and more recyclable elements at the design and development stages, as well as researching recyclable materials and structures.

## Promotion of recycling at the development stages

### ● Attainment of over 90% recyclability ratio in new models

Currently about 80% by weight of end-of-life vehicles (ELVs) can be recycled, mostly steel, aluminum and other metals. Plastic, glass and other materials making up the remaining 20% are generally shredded and landfilled. In order to better utilize this shredded material, Mazda is pressing ahead with the following research and development projects.

- 1 Research into automobile design that takes into consideration ease of dismantling, and research into dismantling technology, to simplify the recovery of parts and materials that can be reused.
- 2 Research into use of resins, which make up a significant proportion of shredder residue, so as to reduce the number of different materials used in parts, making them easier to recycle.

We have achieved a recyclability ratio of 90% or better for new model cars sold from FY 2002.

### ● Surveys / research into ELV recycling technologies

In addition to the reduction in quantity of shredder residue produced, mentioned above, Mazda is also involved in surveying and researching recycling technologies for end-of-life vehicles (ELVs).

We are also working towards carbon neutralization (bringing the quantity of CO<sub>2</sub> emitted when a substance is burned in line with the quantity consumed by photosynthesis as it is developed) through developing natural materials that can be made into eco-plastics.



### Example of improved recyclability in Premacy

#### Instrument panel

Use of vibration adhesion to make air duct dismantling easier

#### Door module

Modularization allows simplification to use of PP

#### Door trim

Changes to adhesion method allows simple separation of PP and PUR

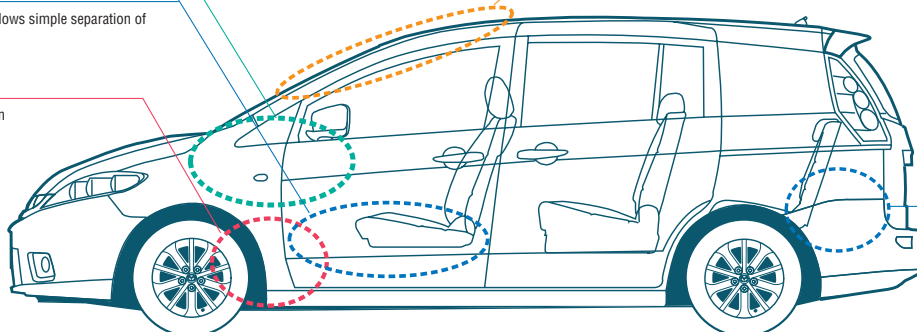
#### Dash insulator

Simplification of noise insulation and noise absorbing materials



#### A pillar trim

Changes to adhesion method allow simple separation of PP and PUR



#### Trunk side trim

Changes to adhesion method allows simple separation of PP and felt

PP: Polypropylene PUR: Polyurethane

#### Glossary: 1

#### Automobile Shredder Residue (ASR)

The residue remaining when metals have been removed from the product of shredding car bodies. Comprised of plastics, glass, rubber, etc.



**Development targets, and attainment status, for promotion of recycling and reduction in use of resources**

category	Objective	Results for FY 2004
Reduction in output of waste and use of resources (Improved recyclability)	Raise the recyclability ratio for new cars to 90% or higher from 2002	Attained in Verisa, Premacy
	Actively promote the use of recycled bumper material in components for new models	47,300 damaged bumpers collected from the marketplace and utilized in components for new cars. Proprietary paint stripping technology used to establish bumper-to-bumper recycling for use in new cars.

**Recycling damaged bumpers into bumpers for new cars**

Mazda is working hard on developing techniques for recycling resins, which it believes should be completely recyclable in the future. We have achieved significant results in the area of recycling bumpers, which are particularly large-scale resin parts.

**● Bumper recycling promotion**

Since 1992, Mazda has been collecting damaged bumpers from dealerships (see page 50 for details) and reusing the resin materials from them in undercover and other automobile component materials. Since 2001, we have been able to remove between 98% and 99% of the paint from such bumpers, allowing us to create components from the recycled materials that are at least as strong as those made from new materials, and use the recycled material as bumper reinforcement parts and grain surfaced bumpers.

Removing 99% of the paint from the bumpers, however, meant that it was still not possible to create the smooth surfaces required for bumpers on new cars, which require especially clean lines for painting.

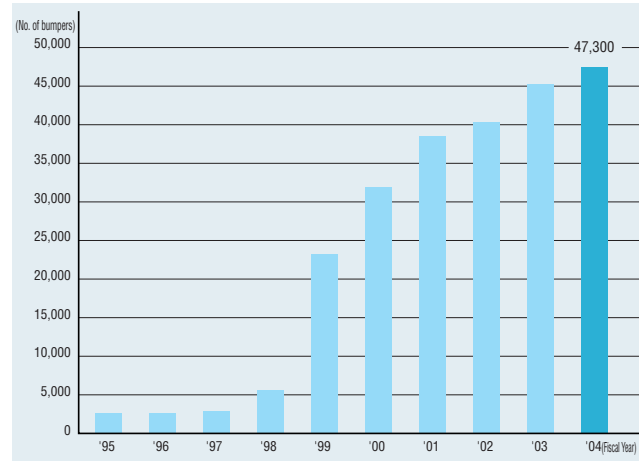
**● Achieving bumper-to-bumper recycling**

Mazda joined forces with the grain processing company Satake Inc. in 2003 to develop an optical selection technology that allows the removal of paint membrane from recycled bumpers (patent pending). We have achieved a highly pure material recovery process that allows the removal of 99.9% of paint membrane, and subsequently have been able to develop components from this material that have the same level of strength as bumpers made from entirely new materials. The bumpers made in this way can also be painted to the high quality standards required in new cars. This 'bumper to bumper recycling' process was put into practice creating the rear bumpers for RX-8 models manufactured from the end of March 2005. Mazda intends to introduce recycled bumpers made from this recovered material with the paint removed into other models, as well as pressing ahead with other aspects of automobile recycling.



The RX-8 with a recycled rear bumper

**Trends in number of bumpers collected**



**Close up**



**Achieving bumper-to-bumper recycling  
A new sense of meaning for recycling in the future**

Kazuhisa To, Technical Research Center

Bumpers are large plastic components, and as such, it is obviously more effective to be able to reuse bumper material not in tiny car components but in larger parts, in order to be truly effective at recycling. Being able to remove 99.9% of the paint from used bumpers, as opposed to only 99%, made a huge difference in our ability to do this, and it was a change in our way of thinking that brought this about. We had to think of a way not just to raise the 99% achievement even higher, but to create a whole new technique, and for this we looked to the optical selection techniques used for cereals and other materials. We worked on evolving and applying these techniques to create a highly pure product that could be used in component production. In the process of evolving car recycling techniques, bumper-to-bumper recycling is an extremely large step forward. Having crossed this line makes me feel that we have given the concept of recycling a whole new meaning for the future.

