



Parameter: Recycling

Reference Document:

EFV 07-04: Recycling

Automobiles are the most recycled consumer product. By weight, the typical passenger car consists of about 65 percent steel and iron. The steel used in car bodies is made with about 25 percent recycled steel. Many internal steel and iron parts are made using even higher percentages of recycled steel. All steel products contain recycled steel because steel scrap is a necessary ingredient in the production of new steel. Steel scrap is derived not only from automobiles but also from steel cans, appliances and construction material. Recycling is an effective way to reduce greenhouse gases. When we recycle, we avoid the greenhouse gas emissions from landfills and incinerators. We also reduce the need to extract new resources from the earth and replace logging, drilling, and mining of virgin materials with recycled materials that we no longer want. This greatly reduces the energy it takes to process and manufacture new goods.

The life of automobile includes different phases beginning with the extraction of raw materials and ending with the disposal of vehicle. In all life phases, processes transform energy or material from one phase to another. After usage, the Vehicle is subjected to disposing and recycling. But recycling is not always the best strategy. Some factors should be considered to find out the impact of recycling. Recycling steel saves energy and natural resources. The USA steel industry annually saves the equivalent energy to power about 18 million households for a year. Recycling one ton of steel conserves 2500 pounds of iron ore, 1400 pounds of coal and 120 pounds of limestone.

Some procedure should be followed during the recycling of automobiles. Initially all the contaminated and hazardous substances should be removed. It may include battery, fuel, oil, coolant, windscreen, washer fluid, airbag, and air-conditioning. It will promote the safe and hazard free working environment. After that the windows, doors, seats, bonnet, bumper, window rubbers, dashboard, front and rear lights and any object left behind on the car is to be removed. Thirdly, the complex assemblies like engine, gearbox, transmission system, axles and exhaust system are removed. In the final workstation the shock absorbers detached from chassis, all remaining material and parts will be removed

from chassis including radiator, wiring, heater, windscreen wiper and fluid tank. After this a final inspection will be done to ensure the removal of all material. These steps will be followed by the disposal of materials. All the material separated will be intended to transport the processing, disposal, reuse as per the material type, reusability, and disposability.

Rating Parameters	Weightages Assigned
Provision of recycling strategy during vehicle design	15 %
Use of Environmentally friendly material	15%
Development of product's recycling/reuse/scraping manual and coding of recyclable parts in vehicle	10 %
Extent of Recyclability of vehicle	60 %

Provision of recycling strategy during vehicle design: At very first of the vehicle design, the recycling strategy at the end of life should be developed in order to ensure the complete disposal of the scrap without leaving any burden on the environment. Environmentally sound scrapping only happens to the material, which can be recycled. The non-recyclable material in the automobile remains in the atmosphere. It should be decided early the recycling of aluminum, steel, plastic components. Therefore, the strategy for recycling should be developed in advance. For example, the European directive on End-of-Life Vehicle, which from 2003 requires vehicle manufacturer to remove heavy metals such as lead and mercury from vehicle components. The directive also dictates ELV material recovery or re-use rates of over 85% of the whole vehicle from 2006 and over 95% from 2015.

Use of Environmentally friendly material: The uses of materials that cause less environmental damage are a popular measure when performing design for Environment. Since most of the products today are cost optimized, a change in the material composition of a product potentially increases the cost of that product. Policies on restrictions on the use of the hazardous substance (ROHS) like lead, cadmium, mercury etc. should be helpful in this regard. More and more use of recycled material will be helpful to reduce the cost and energy.

Development of product's recycling/reuse/scraping manual and coding of recyclable parts in vehicle: The primary responsibility of the manufacturer is to provide the scrapping, reuse or recycling manual of the product so as to facilitate the scrapping process at the end of the product's life. It is necessary for the environmentally sound product disposal. The material should be marked with suitable ID mark. This system makes it easier to sort materials taken from dismantled end-of-life vehicles. This manual should also provide the information and the sequence of operations to be performed during dismantling and recycling.

Extent of Recyclability of vehicle: The Recyclability level is the percentage of the total weight of the vehicle, which can be recycled easily, economically and in environmentally

sound manner. Higher the recyclability levels of the vehicle, better it is and higher marks will be awarded to it.

Sr. No	Recyclability level in % [(Weight that can be recycled *100)/total weight of vehicle]	Score awarded to vehicle in %
1	Less than 60	0
2	From 60 up to 74	15
3	From 75 up to 84	30
4	From 85 up to 95	45
5	Above 95 %	60

So, the End of Life of Vehicle Strategy for EFV should be defined on following points:

- To define recycling mechanism; identify present usage of various materials for construction of vehicle.
- Identify non-recyclable, hazardous, flammable, and toxic materials that go in vehicle construction.
- Mark the components during production suitably which will help to differentiate during the dismantling of vehicle
- The criteria should be inline with the regulations on ELV and RoSH (Restrictions on the use of the hazardous substance)

The notion behind this is to encourage the vehicle manufacturer and material and equipment manufacturers to control and reduce the use of hazardous substances. This is also to promote the design for dismantling, reuse and recovery – in particular the recycling of end – of-life vehicles, their parts, components and material. By this way the manufacturers will be encouraged to integrate an increasing quantity of recycled material in vehicles to develop the markets for recycled materials. However, the cost for recycling is also a major issue. Thus, the automotive recycling Industry plays an important role in the efficient and ecological disposal of the waste motor vehicles. Additionally it will conserve natural resources, reduce air pollution, water pollution and solid waste generation. As automotive industries are representing the large portion of industrial production streams, advancements in recycling will show significant effect on the global environmental policies.
