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Recycling the engineering (Automotive) plastics end of life vehicle applications

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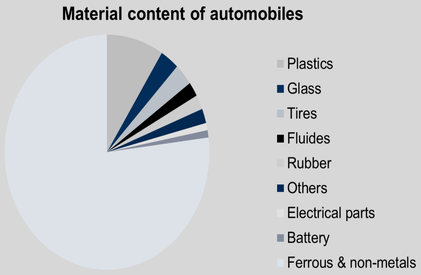
Aim and Objective

The main objectives of this papers are:

- Identify the disposal and management of car plastics part after use.
- Find out the effect plastic waste brings to the Indian environment.
- Identify measures of improving plastics waste management in the automotive sector, (end-of-life different type of vehicle).
- Analysis the benefits of re-using or recycling of plastic waste in automotive sector.
- It can help to identify better ways of controlling the waste generated in India.
- It can reduced the production of the engineering plastics from the petro-chemical source.
- To using conversion technology to added additives, fillers and nanocomposites in recycle plastics to use many applications.

Introduction

- The introductions of plastics to replace the traditional materials in the vehicle industry do not only reduce product cost but also reduce production cost.
- In a quest to overcome the adverse problems associated with its use in automobiles, many concerns have been raised with the paramount ones being about the high cost due to manufacturing and part cost as well as harmful emissions like carbon dioxide (CO2) from petrol combustion.
- The manufacturing of car plastic parts such as batteries casing, dashboard, seat cushion, bumper, head lamps, chassis to roof, rear lamp, window shield, inner body housing and wash-liquid tank ect.,
- That plastics improve fuel economy by reducing weight, but they also require petroleum as a raw ingredient.



A list of engineering plastics in automobile industry

Chemical name	Abbreviation	Applications
Polycarbonate	PC	Bumper Panels, Radiator Grilles
Polyurethanes	PUR	Arm Rest, Seat Cushion
Polyethylene (High and low)	PE (HD,LD)	Bumper
Polypropylene	PP	Bumpers, Battery Case
Polyamide	PA	Wheel Covers, Fuel Tanks And Filler Flap, In Fold Manifold
Polyphenylene oxides	PPO	Body Parts E.G. Hatchbacks And Mudguard
Acrylonitrile butadiene styrene copolymers	ABS	Mirror Housing, Wheel Covers, Front And Rear Spoilers
Styrene acrylonitrile	SAN	Radiator Grilles
Thermoplastic polyolefins	TPE,TPO	Bumpers, Dashboard
Polybutylene terephthalate	PBT	Plug Connectors
Polymethyl Methacrylate	PMMA	Window Visor, Taillights Headlights

Properties of Engineering plastics

- **PC** is one of the major plastics that has gained grounds in the automotive industry due to its versatility, toughness, transparency (optical), dimensional stability, impact and temperature resistance.
- Flexible **PU** foam has an extremely elastic core with very high resilience .
- **PP** chains thereby causing some changes in mechanical properties, like improved processability, low temperature performance and ability to elongate.
- **PA, PMMA** other engg., plastics has very resistant to wear and abrasion, have good mechanical properties even at elevated temperatures, have low permeability to gases and have good chemical resistance, they also have good toughness, high strength and are good flame retardant .

The major problems that oppose plastics application in automobiles

- Insufficient technology for dismantlers to use to collect various plastics separately as plastics are usually collected and recycled with same kind and types.
- Material wastage of raw materials during processing. example molding complex parts like the fuel tank.
- Lack of plastic recycling infrastructure.
- Loose of value of recycled plastics compared to newer plastics.
- Expensive cost of recycling plastics with the few recycling possibilities.
- A door panel, seat of PUR foam , Mirror housing, Air ducts, Manifold and rim are shown in figure.

Plastics waste recycling process

Identifying and sorting plastics:

Manual sorting:

Density based:

- Density based technique form of sorting is carried out in a hydrocyclone , float or sink tank . Float- Polyolefins, Sink-Engg., Plastics & Thermoset.
- The fillers added to the Plastics it can't separate density based method.

Selective dissolution:

- Selective dissolution sorting is supported by batch dissolution of assorted plastics using solvents.

Plastics Waste recycling process:

Mechanical Recycling:

- Normally entail assessment for exclusion of contaminants or further arrangement, washing, grinding, drying, filtering and conversion into either flakes or pellets.

Feedstock or chemical Recycling:

- It is include chemical depolymerisation (glycolysis, methanolysis, hydrolysis, ammonolysis etc), gasification and partial oxidation, thermal degradation (thermal cracking, pyrolisis, steam cracking, etc.,

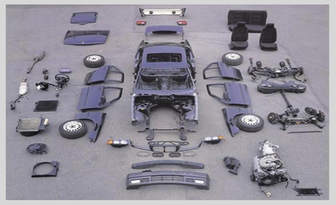
Energy Recovery:

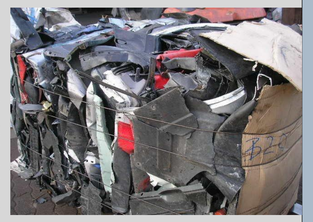
- The plastics waste can be converted the fuel & other energy sources.

Automobile plastics waste recycling process

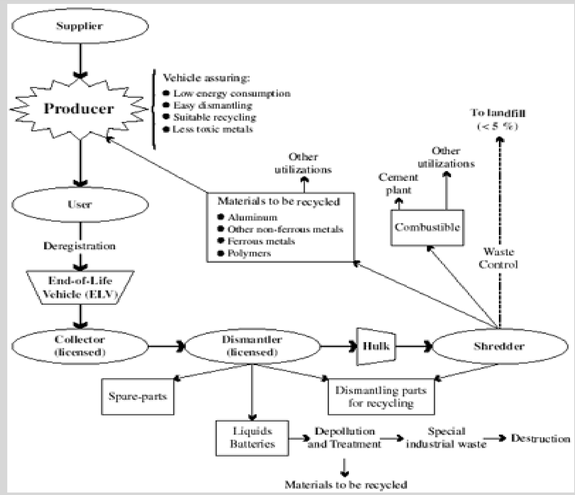
The various process include are:

- Draining the vehicle.
- Dismantling.
- Sorting .
- Processing reusable parts.
- Grating the rest of the body.





The major steps for ELV Recycling



- The end use life of vehicle could be recycled to get the aluminium, other non-ferrous metals, ferrous metals and polymer also.
- The plastics wastes are separated from the end use life of vehicles and using different methods to get specified polymers.
- Once recycling the plastics automatically the properties of the plastics are decreased.

Advanced technology

- Now a days so many researches going on to the improve the properties of the recycled plastics.
- The additives, fillers and reinforcement are using in the recycled plastics to improve the desired the properties.
- Because the plastics are tailor made material to produced the products depends the applications.
- The main objectives of recycled plastics are reduced the cost and reduced the productions of petrochemical base plastics raw materials.
- The advanced technology of the recycling the plastics are the nanocomposites, such as Nanoclay, Nano fillers and Carbon Nanotubes to added the recycled plastics.
- They are using nanocomposites definitely improve the properties of recycled plastics, but the cost is high.

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