1.

FACTSHEET

RECYCLABILITY OF PU PARTS FROM END-OF-LIFE VEHICLES

APRIL 2026

EURO MOULDERS
European Association of Manufacturers of Moulded Polyurethane Parts for the Automotive Industry

1. RECYCLABILITY OF PU PARTS FROM ELVs

Introduction

Plastics are **omni-present in cars** and, on average, account for **~10%** of the total mass of the vehicle. Polyurethanes are the **second most-used plastic in cars** (up to **24 kg per vehicle**) and can be produced using a **variety of raw materials**: fossil-based, bio-based, bio-circular, and circular (recycled) feedstock.

Polyurethanes are widely used in automotive interiors due to their **versatility**, **customisability**, **durability**, and – above all – **comfort** properties. The utilisation of polyurethane in vehicle interiors brings forth a multitude of benefits, making it a preferred choice for **numerous applications**:

seating cushions | **instrument & door panels** | **carpet underlay** | **acoustic insulation** | **battery encapsulation**

The proportion of polyurethanes in vehicles is set to further increase as the automotive sector transitions away from combustion engines **towards e-mobility solutions** and changes specifications on **noise, vibration, harshness (NVH) and thermal insulation**, amongst others. This goes in line with the ongoing endeavour of the automotive supply chain to **reduce the weight of vehicles**, thus **improving energy efficiency** and **reducing the overall CO2 emissions**.

Drivers for Change: EU Regulatory Landscape

The **European Union (EU)**, has set itself an ambitious target to become the **first climate-neutral continent by 2050**. This requires reviewing nearly all its policies, seeking to transform the way Europeans produce and consume, and to steer the economy towards **more circular/sustainable business models**. The **automotive sector**, known for its resource intensive processes, is among the **priority sectors** which policy intends to make more sustainable, notably as regards **vehicle production**, their **use** and their **end-of-life management**.

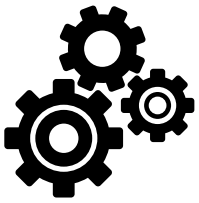
The new **End-of-Life Vehicles Regulation (ELVR)** is paving the way for more sustainable plastics in cars. It will require: 1) **increase recycling** of automotive plastics, and 2) **compulsory integration of recycled content** in plastics used in vehicles.

There is growing focus on developing innovative technologies to **reduce the use of fossil-based feedstock** while lowering the environmental impact of PU foam production. As the demand for products with a lower carbon footprint and transition to circular products gains weight, **the automotive industry has to consider and use all solutions available**.

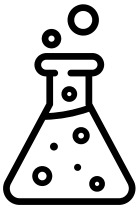
1. RECYCLABILITY OF PU PARTS FROM ELVs

The Challenge: Life After the Road

Polyurethane being a **thermoset**, it cannot be easily remelted like common thermoplastics. However, it **can be recycled through dedicated pathways**:



Mechanical recycling, a well-established method involving the physical processing of plastics to create recycled materials. While effective for many applications, it encounters **limitations** when dealing with **complex polymer structures** and **mixed-material components**, commonly found in automotive design. For polyurethanes, the usage of recyclates via mechanical recycling – such as rebounded foam or BASF meltable foams – **is a viable option.**



Depolymerisation or **chemical recycling**, where flexible polyurethane foam is **broken down** into its specific constituent **chemical raw materials**, which can be used again to make fresh foam. Currently, there are **several depolymerisation plants** operating in Europe, which use **end-of-life mattresses** to produce **recycled polyols**. The use of such polyols to make parts for the automotive industry is **constrained** because of **partial loss of quality**. EURO-MOULDERS has initiated a project to demonstrate that **PU foam from end-of-life vehicles** can be **a source for recycled polyol**. This high-quality polyol can be re-used for making new car seat foam that meets the **recycled content** requirements of the **ELV-Regulation**.

Thermochemical recycling (gasification) when mixed with other materials in shredder residue, producing **virgin-equivalent raw materials** for the petrochemical industry.

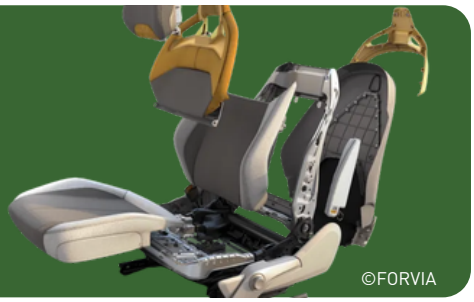
1. RECYCLABILITY OF PU PARTS FROM ELVs

The Solutions: How to Improve Recyclability of PU Parts in Cars

Design and Disassembly

While polyurethane as a material **is recyclable**, there is potential for improvement in the **current design and waste treatment technologies**. For example, traditional automotive seating are a **composite of many different materials**, often consisting of PU foam glued to textiles, metal frames, and plastic inserts. This means they must be **dismantled** to separate all components. This is today **both cost and labour-intensive** and independent on plastic material used for making a car seat. To improve recyclability, OEMs are shifting toward **Design for Recycling** and **monomaterial concepts**. Incorporating environmental considerations in vehicle parts design can improve recycling efficiency and change how polyurethane is manufactured upstream.

Some examples of pioneering technologies already exist, where **modularity** is the core principle of the conception work. This is the case of **modular seats**, which reimagine the architecture of a traditional car seat through the assembly of a **limited number of modules**.



Improving sorting technologies

Recent collaborations, such as the project between **Dow** and **Gruppo Fiori**, have introduced breakthrough technology which **eliminates the disassembly step** and produces a clean polyurethane waste stream directly from end-of-life vehicles, with the purity necessary for depolymerization and chemical recycling.

Improving recycling technologies

One of the main challenges for recycling is the **access to waste streams clean** enough for chemical recycling. For recycling of polyurethanes to take place at scale in the future and for producers to incorporate a minimum level of recycled content in new PU, the **recycled material needs to be available beforehand**.

The Road Ahead: Scaling-Up

To make the recycling of PU foam in car parts happening, the **right conditions are needed**. This includes **putting the right infrastructure in place** and **cost-efficient dismantling technologies** for car components to obtain **PU foam from ELVs clean** enough for **mechanical** and **chemical recycling**.

PU recycling must become **more scalable and reliable**, ensuring that the materials that keep us comfortable today can be recycled multiple times for the cars of tomorrow.