



PROJECT FINDINGS:

- ▶ New uses for recycled thermoplastic polyolefins (TPO) could divert over 145 million pounds of bumper fascia from landfill
- ▶ Recycled TPO pellets from bumpers can meet 85-90% of virgin TPO mechanical properties
- ▶ Local body shops are a good source of TPO bumpers with little contamination and are willing to participate in a recycling program
- ▶ Collection programs must occur on a frequent and consistent basis
- ▶ Recycled TPO can be used in multiple types of end products
- ▶ Ultra-Poly's collection and processing of TPO bumper fascia can divert approximately 1 million pounds of material from landfill beginning in 2021, with potential for continued growth
- ▶ When planned appropriately, TPO bumper fascia recycling from auto body shops has been demonstrated to have economic benefits

Ultra-Poly Corporation Recycles Plastic Car Bumpers with High Degree of Purity

NEW END MARKET OPPORTUNITIES (NEMO) FOR
END-OF-LIFE VEHICLES (ELV)

CASE STUDY

◆ THE PROGRAM

The **Plastics Industry Association (PLASTICS)** represents the entire plastics industry supply chain. Sustainability and the promotion of recycling plastics is a priority for the industry and association. The association's **New End Market Opportunities (NEMO)** initiative works to solve logistical or technical problems that limit the use of recycled plastics, creating demand-side pressure to encourage the diversion and recycling of plastics. These projects assemble groups of people such as material suppliers, recyclers, compounders, academic researchers and brand owners interested in the topic from across the supply chain.

PLASTICS launched the NEMO for ELV project in 2015 to evaluate the feasibility of collecting and recycling plastic bumper fascia from automobiles. A bumper is around six feet long, between six to eight pounds on average, and primarily made of thermoplastic polyolefins (TPO). It is estimated that over 145 million pounds of TPO plastic bumpers make it to landfill each year. Additional information from Phase I and Phase II of the project can be found on our website.



◆ THE CHALLENGE

Ultra-Poly Corporation successfully developed a process to collect and recycle TPO bumpers, which they anticipate will divert approximately 1 million pounds of plastic from landfill in 2021.

Ultra-Poly Corporation is a plastics recycler located in Pennsylvania with five locations, offering a wide range of custom compounded polypropylene and polyethylene resins from recycled plastics. They also provide toll reprocessing services for plant-generated scrap in several different industries. The recycled plastic resin they produce is used in a wide variety of applications, including but not limited to plastic bags, injection molded parts, extrusion molding and large structural components. With an annual production capacity of over 250 million pounds across five plants, Ultra-Poly is currently one of the largest plastic recyclers in North America.

Based on the findings in the first two phases of the study coordinated by PLASTICS, a third phase of the project sourced post-consumer bumper fascia bales for processing by several of the workgroup members to understand the challenges of reprocessing the material and to evaluate the physical characteristics of the end-product.

Ultra-Poly separated and visually inspected the bumper fascia to remove any obvious non-plastic items, including loose wiring, metal brackets and metalized plastic. The bumper fascia was then sent through multiple layers of shredders, using magnets to pull out any additional attached metal contamination and elutriation to remove any adhesive labels. The resulting uniform grind was fed through an extruder and then pelletized. After pelletization, the material was injection molded into ASTM flex and tensile bars to be used for testing physical properties.

◆ THE SOLUTION

Ultra-Poly Corporation concluded that the bumper fascia bales could be easily handled and processed with a low degree of contamination. Material testing on the injection-molded test samples proved to exhibit physical properties (such as flexibility and elasticity) close to those of virgin TPO. After the initial project work, Ultra-Poly worked on adding the bumper fascia recycling program to their business model.

As with many recycling initiatives, the material collection logistics presented a significant hurdle. After investigating multiple bumper fascia sources, such as auto body scrapyards and dismantlers, it became clear that it would be most practical to target auto body shops where bumper fascia are entirely removed from automobiles when replaced.

Ultra-Poly found that body shops are extremely interested in this program due to the size and bulkiness of a car bumper, which is generally disposed of through their waste collection system, often via a dumpster. The space in a dumpster is costly, and adding these bulky bumpers requires more dumpster pickups, each pickup at a cost to the body shop. Additionally, body shops are pleased that bumper fascia is destroyed during the recycling process, ensuring that damaged bumpers will not be “re-manufactured” and potentially sold to their shops as replacement parts for future repairs.

The material stream is typically cleaner from a recycler perspective when sourced from an auto body shop versus another location. Most items that would be considered contaminants such as brackets, wiring and lighting, are carefully removed and reused at body shops. While there are several reasons that this program is a win-win for both recyclers and auto body shops, to ensure participation by the body shops, Ultra-Poly learned that it is critical for bumper pickups to happen consistently and at a regular interval. In Ultra-Poly's case, each body shop is visited monthly, on a set schedule, with an average shop generating 20-30 scrapped bumper fascia per month. Ultra-Poly can collect between 600-800 bumpers per run across multiple routes according to their current plan.

Ultra-Poly's reprocessing method has resulted in an end TPO pellet that exhibits 85-90% of virgin TPO mechanical properties, thus expanding the end-market opportunities for the recycled material. This recycled material is currently being used as an additive in compounding for multiple different materials, such as injection-grade polypropylene. Because of its high impact strength, this material is used for manufacturing bins and totes. Ultra-Poly believes there are more opportunities for this reprocessed TPO material and the potential to create a fully circular economy with automotive manufacturers in the near future.