

Busting 4 Common Myths About Polymers with Recycled Content

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Performance Solutions



Table of Contents

Introduction

Myth 1: Recycled content negatively affects the performance of end-use applications

Myth 2: Shortages of PCR can leave manufacturers without the resins they depend on

Myth 3: The main benefit of incorporating recycled content is cost reduction

Myth 4: Virgin resin properties should always be the benchmark

RESILIENCE® R materials for automotive

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Introduction

Replacing some or all of the virgin polymer in an application is a sustainability goal promoted by regulators, governments, brands, consumers and the plastics industry itself. Many automotive manufacturers want to transition to polymers containing post-consumer or post-industrial recycle (PCR/PIR), but are concerned about consistency, availability, quality and performance. These worries, while understandable, may reflect common myths about using plastics with recycled content.

Let's explore these myths to understand how they can be "busted" by a polymer supplier with a robust supply chain, sophisticated testing and quality systems, comprehensive support services, and a broad and growing portfolio of advanced materials.

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Myth 1

Recycled content negatively affects the performance of end-use applications

Feed streams for recycled material, both PIR and PCR, can vary, raising the possibility of substandard or inconsistent material properties from batch-to-batch. This is true because:

- Even after sorting, incoming recycled materials can contain different grades of a particular polymer, such as polypropylene (PP)
- It can be contaminated with other materials
- The recycling process can cause degradation

Polymers made with inconsistent recycled content may have reduced chemical, thermal and impact resistance and inferior processing performance compared to virgin materials, which could ultimately negatively affect the successful development of end-use applications.

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Busting Myth 1

The collection of inconsistent recycled material can be resolved by the material supplier during formulation to ensure consistent performance properties, regardless of the feed stream's composition and the effects of recycling.

Look for a resin supplier that conducts rigorous testing of each incoming material batch against tight specifications and issues certificates of analysis (COAs) that demonstrate compliance with these specs.

The supplier should also possess the formulation expertise and technical capabilities to produce a consistent blend of virgin and recycled resins. This process can involve additives, fillers, modifiers and agents.

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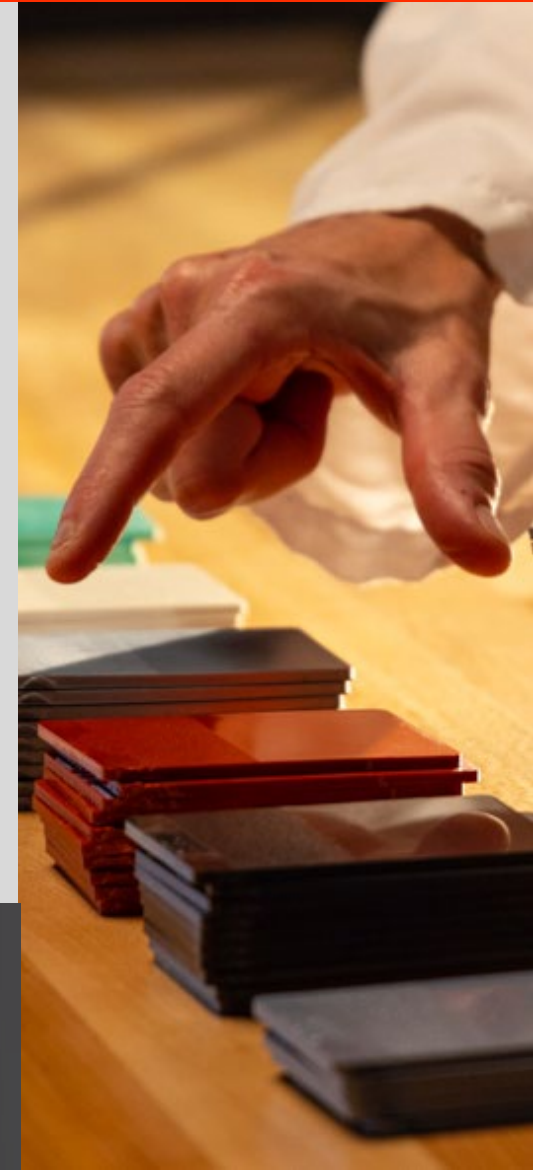
Quality Control of Recycled Resin

GEON follows strict protocols for each batch of PIR material used in its RESILIENCE[®] R products, which contain up to 35 percent recycled content. These include:

- No compromise in quality control (QC) standards as compared to prime material
- Evaluation of samples from every lot of incoming recycled material
- Measurement and verification of mechanical properties using recognized industry standards, such as ASTM methods. These include:
 - + Melt flow rate
 - + Ash level
 - + Tensile strength at yield
 - + Flexural modulus
 - + Notched Izod impact
 - + Screening for contamination and issuance of COAs

The S&P Global Platts Analytics predicts that by 2030, more than 1.7 million metric tons of virgin polymers will be replaced by mechanically recycled plastics – compared to 688,000 mt in 2020.*

**S&P Global Commodity Insights*



Myth 2

Shortages of PCR can leave manufacturers without the resins they depend on

Strong interest in sustainable products among major brands has led to high demand for certain types of recyclates, such as recycled polyethylene terephthalate (rPET) and rPP. Supply chain issues, including labor shortages in collection and recycling companies, are also contributing to shortages of recyclates. Finally, the level of plastic recycling is dropping, due primarily to a sharp reduction in plastic waste exports to countries like China.

Often, automotive OEMs and tiers are concerned about possible production interruptions or delays caused by shortages. Reliable supplies of resins containing recycled content are essential throughout the entire production period for an automotive part – or the entire vehicle.

From 2018-2021, the U.S. plastic recycling rate dropped from 8.7% to 5-6%.*

**Reuters*

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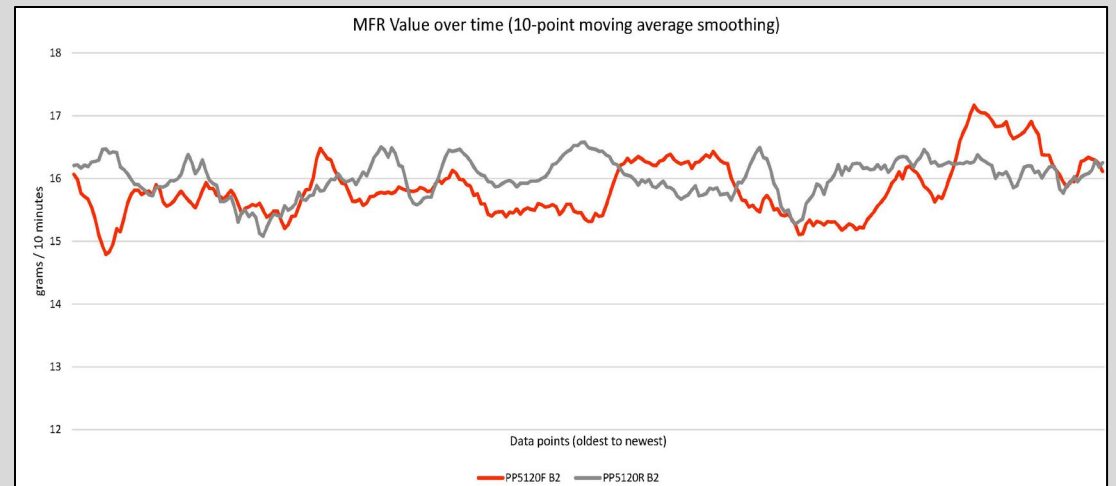
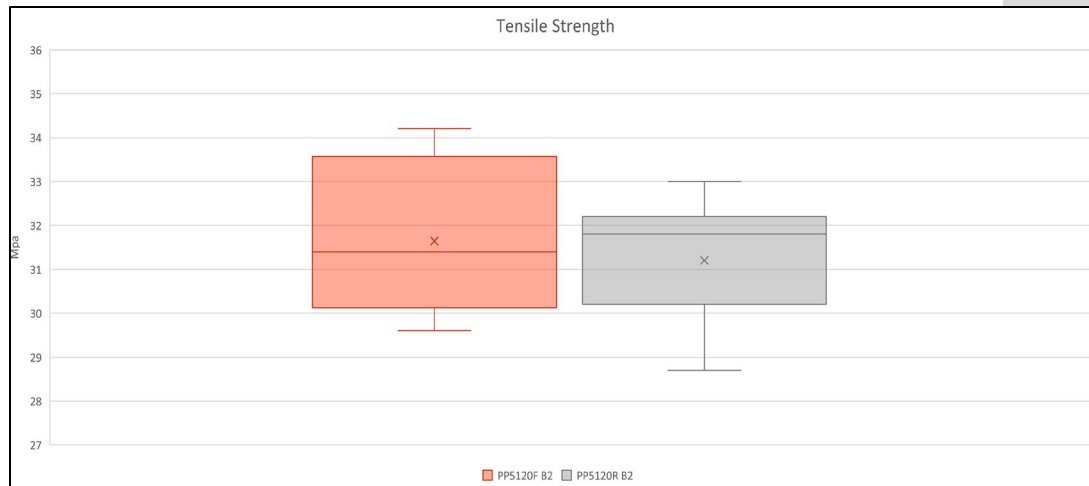
Busting Myth 2

To be sure you have a “Plan B” in the event of a PCR/PIR shortfall, look for a resin supplier that offers offset materials for grades with recycled content, as well as alternative grades that could work with your applications. The ability to drop in a virgin resin offset can avoid manufacturing interruptions due to unexpected recycle stream material shortages, while ensuring nearly identical processing and performance.

Comparative Testing

Tensile Strength and Melt Flow Rate

Comparative testing of a RESILIENCE R PP grade (PP5120R B2) and its virgin equivalent (PP5120 B2) show only minor variations in properties. The graphs for tensile strength and melt flow rate below showcase the similarity between the recycled and virgin materials.



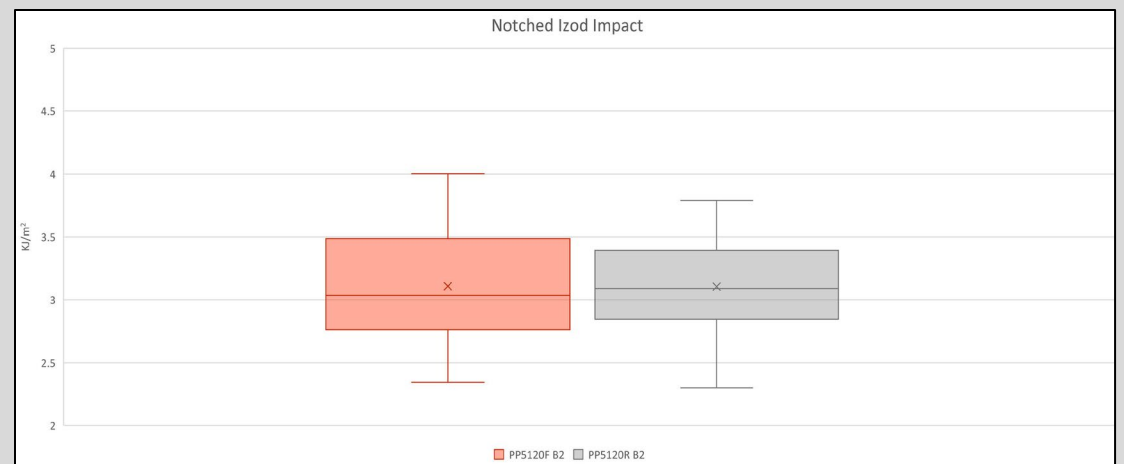
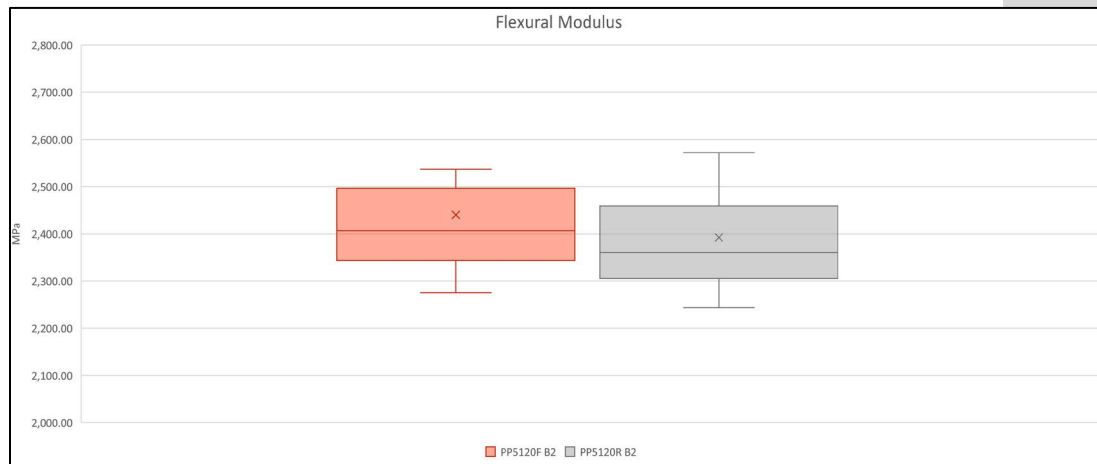
Busting Myth 2 cont.

GEON offers virgin equivalents to its extensive portfolio of RESILIENCE R PP resins. These advanced materials meet the specifications of leading automotive OEMs and other industry manufacturers. Customers have the flexibility to switch back and forth from virgin grades to RESILIENCE R grades as needed, without concerns about changes in properties or processing. Furthermore, GEON's broad portfolio of RESILIENCE R grades, both filled and unfilled, offers many possible material options.

Comparative Testing

Flexural Modulus and Notched Izod Impact

The graphs for flexural modulus and Notched Izod impact showcase the similarity between the recycled and virgin materials.



Myth 3

The main benefit of incorporating recycled content is cost reduction

Manufacturers may think that, compared to virgin resin, recycled plastic will lower application costs because it does not have to be produced from scratch. Actually, the story is more complicated than that. The process of reclaiming, sorting, recycling and reformulating PCR and PIR adds costs that can make products with recycled content more expensive than virgin equivalents, in some cases.



Busting Myth 3

Even if saving money isn't a realistic reason to transition to recycled content, there are other compelling business arguments. For example, manufacturers might:

- Meet corporate sustainability goals such as reducing plastic waste and use of fossil materials; cutting greenhouse gas emissions; supporting a circular economy; and diverting plastic waste from landfill sites and the oceans.
- Address customer/consumer requirements or preferences
- Gain a competitive advantage
- Achieve regulatory compliance
- Strengthen corporate sustainability branding



Myth 4

Virgin resin properties should always be the benchmark

There's a common belief that virgin resin should be the standard against which any possible substitute (like a product containing PCR and/or PIR) is measured. Some manufacturers think that any resin that incorporates recycled content will be inferior to its virgin material counterpart in terms of mechanical properties and processing performance. Therefore, they question whether the PCR- or PIR-based material will meet the requirements outlined for their applications. However, in some cases, the tested properties of a PCR- or PIR-based grade do not need to equal those of a virgin equivalent. Why? Because of over-engineering.



Busting Myth 4

Resins are often tested under harsh lab conditions – high heat, extreme impact – that may be irrelevant for some applications. If a lower-performing material containing recycled content meets your use case and conditions, you may feel confident in adopting the sustainable option, even if it doesn't achieve every performance property of a virgin material.

Collaborating with a trusted supplier that offers formulation expertise with recycled materials, testing, simulation capabilities and application development services can help you identify sustainable options with sufficient properties for your specific product. These alternatives often provide a reduced cost.

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RESILIENCE® R Materials For Automotive

RESILIENCE R products from GEON are filled and reinforced PP grades with minimum standard levels of recycled content ranging from 10 percent to 35 percent. This broad portfolio provides choices of fillers (mica, talc, calcium carbonate), glass fiber reinforcement, or a combination.

RESILIENCE R products can be used for automotive interior parts such as trim, under-hood components and bracketry, and exterior parts such as wheel arches. They deliver light-weighting, optimized rheology, heat resistance, high stiffness, cold temperature ductility, and resistance to scratching and marring.

GEON supports the RESILIENCE R portfolio with a complete array of services and guidance, including application development services, technical support, testing, mold filling and processing trials, and a deep expertise in the automotive industry.

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RESILIENCE® R Products:

- Provide the excellent processability and other benefits of PP compounds
- Can be tailored to a variety of end-use applications
- Use primarily PIR streams and effectively compete in performance against non-recycled content
- Come from secure recycled streams and undergo stringent quality checks for consistent lot-to-lot properties and supply
- Are UL94 HB approved
- Align with industry and corporate ESG goals



Learn More

Learn how GEON's RESILIENCE R materials containing recycled content debunk common myths about transitioning from virgin to recycled resins.

For more information, contact GEON:

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GEON.COM/RESILIENCE

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