

Keys to a Sustainable Future for the

Plastic Injection Molding Industry



AdvanTechPlastics LLC
Global Plastic Solutions From A Reliable Domestic Source.



Keys to a Sustainable Future for the Plastic Injection Molding Industry

Due to growing understanding of the impact of human activities on the environment, the push for sustainability has spread throughout nearly every industry. For example, in the manufacturing sector, companies and consumers have begun searching for greener production solutions. Regarding manufacturers, sustainable business practices can have a number of both environmental and financial benefits, such as lower waste generation, higher operational efficiency, faster customer response times, better brand reputation, and greater long-term viability. That's why more and more manufacturing companies have come to integrate them into their operations.

In the plastic injection molding industry, many of the efforts manufacturers are making to achieve more sustainable operations involve the use of green technologies. For example, they are employing all-electric machinery to reduce energy usage and utilizing biodegradable plastics and bio-resins to decrease waste produced by single-use products.

As a premier provider of plastic injection molding solutions, AdvanTech Plastics is proud to embrace this shift towards more environmentally responsible and economically sound manufacturing practices to ensure a better future for our company and community. Our experts have put together the following guide on the above sustainability technologies currently used within the plastic injection molding industry.



Biodegradable Plastics

The use of biodegradable plastics has increased dramatically across a wide range of industries as consumers demand more environmentally friendly operations. These materials are generally made from fermented canola oil or sugar. This formulation allows them to decompose naturally within the environment under the right conditions, which helps reduce the amount of plastic waste that accumulates in landfills. That's why they are commonly used for the manufacture of single-use products.





There are many types of biodegradable plastics. Some of the most common are:

» **Thermoplastic Starch-Based Plastics (TPS):**

TPS is cheap, readily available, and 100% biodegradable. It is ideal for use in food packaging, disposable utensils, and similar single-use applications.

» **Polyhydroxyalkanoates (PHA):**

PHA is a plastic resin formed by the interaction of bacteria on a sugar or lipid base. It can have a variety of characteristics depending on the molecules combined to make it. In general, it offers stability when exposed to UV radiation, resistance to moisture, and a low propensity to absorb odors. It is a good choice for packaging for cosmetics and food as well as various medical devices (e.g., surgical mesh and sutures).

» **Polylactic Acid (PLA):**

PLA is a plastic derived from tapioca, cassava, sugarcane, or cornstarch that must be thoroughly dried before processing. It is commonly used to manufacture medical implants (e.g., rods and screws) and consumer products (e.g., food and beverage packaging, disposable tableware, and loose fill packaging).

» **Polybutylene Succinate (PBS):**

PBS is made from succinic acid. It is an aliphatic polyester that has similar properties to polypropylene. However, it naturally degrades into CO₂ and water. It can also be mixed with PLA to achieve different strength or impact resistance levels. Typical uses include cosmetic and food packaging, medical implants, and drug encapsulation.

» **Polycaprolactone (PCL):**

PCL is created from vegetable oils. However, it is commonly mixed with starch-based plastic to lower its cost. It is often used in the medical industry for drug delivery devices, sutures, or tissue repair adhesion barriers and scaffolding.

» **Hemp:**

Hemp-derived biodegradable plastic is far stronger and stiffer than polypropylene. Additionally, it is completely compatible with standard plastic injection molding machinery. It is commonly used for panels in the automotive industry and fire-retardant products in the building industry. Additionally, it can be used for water bottles since it will not leach into water.



Bio-Resins

The term “bio-resin” refers to plastic material that is partially or wholly made from biological matter. This broad material group can be divided into two categories: degradable and compostable.



Degradable bio-resins are designed to break down into smaller and smaller pieces.



Compostable bio-resins are designed to be recycled after being combined with specialized bioproducts.

These plastics offer many benefits as a replacement for traditional plastics, including better energy efficiency during manufacturing operations, easier disposal requirements, and lower amounts of toxic emissions.



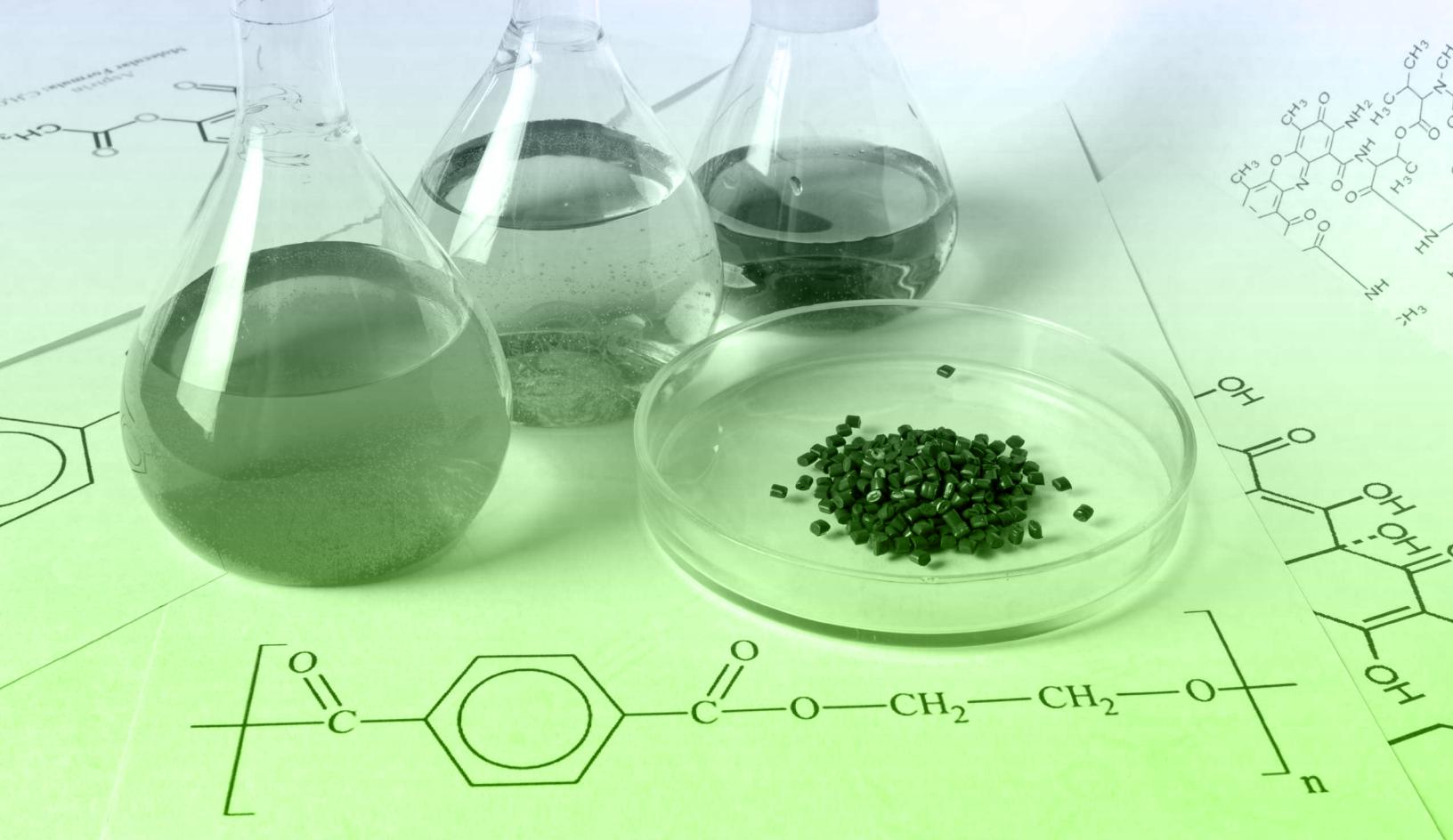


At AdvanTech Plastics, bio-resins are at the core of our current green initiatives. We are in the process of sampling two types of degradable bio-resins to serve as replacements for traditional plastic materials in our injection molding operations: one resin made from algae and one made from saltwater.

Our algae-based resin is a thermoplastic compound containing a significant amount of algae biomass and bio-based additives. It can be used as-is or as a master batch that is let down to the desired loading levels in the end product. In a 30% loaded injection molded component, mechanical properties may include:

Melt flow index: 7.7 g/10 min. (2.16kg @ 190° C)	Density: 1.13 g/cc	Tensile strength 16 MPa	Tensile Modulus: 592 MPa	Elongation: 27%
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Our additive resin is designed for use in approximately 1% mixtures. It helps plastic materials break down in landfills. Normal breakdown takes about ten years, depending on the type and thickness of the resin.



Bio-Assimilation Additive

In addition to sampling degradable bio-resins, the AdvanTech Plastics team is developing an FDA-approved additive for polyolefin resins (polyethylene and polypropylene). It is designed for use in approximately 1% mixtures. Products containing it are 100% recyclable. However, if they were to avoid the recycling process, they would be able to bio-assimilate naturally in 6 to 42 months, depending on the conditions, and leave behind no microplastics. The compound activates microbial activity after a programmed shelf life of 24 to 64 months, resulting in 100% consumption back into a renewable bio-friendly material within 6 to 42 months. This outcome is verified through ASTM 5526 and 6954 testing. In comparison, normal plastic breakdown takes about ten years, depending on the type and thickness of the resin.

We are also looking into pairing this bio-assimilation additive with post-consumer resins (PCR). EcoPrime™—the HDPE PCR we are considering—is approved by the FDA and our development partners.



Move Toward a Sustainable Plastic Injection Molding Future With AdvanTech

Want an injection molding partner who looks out for the future? Choose AdvanTech Plastics! We are fully committed to implementing and maintaining sustainable manufacturing practices to ensure a safe and clean world for coming generations. While we've already adopted energy-efficient lighting and material recycling programs to reduce our energy usage and waste production, we are always willing to do more. Our research into greener plastic injection molding material alternatives will hopefully help push our company and the industry as a whole toward a more sustainable future.

To learn more about sustainability in the plastic injection molding industry and how the team at AdvanTech is working toward it, [contact us](#) today.



About Us

AdvanTech Plastics strives to ensure world-class results providing design engineering, mold-design and build, molding, and secondary operations. Our engineers and staff have the knowledge base, experience and a zero-defect mentality to ensure efficient designs, rapid cycle-times, obsessive attention to tolerances, and on-time delivery.

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