

Advancing Material Science in Outdoor Power Equipment

The outdoor power equipment industry is rapidly innovating to address consumer demand for sustainable tools that don't compromise performance. To address growing consumer expectations, outdoor power equipment manufacturers are leveraging material science to create products that are stronger, lighter and more efficient than ever before.



Lightweighting – Manufacturers are examining every component of today's outdoor power equipment for weight saving opportunities. Much of this is focused on replacing metal components with advanced thermoplastics. While the weight savings of an individual component might seem small at first, reducing the weight of multiple parts ultimately adds up to a lighter tool for the consumer or commercial landscaper. For the manufacturer, the savings on shipping costs can quickly add up when multiplied by thousands of units.



Electrification – Electrification is a major trend in both the consumer and commercial landscaping markets since it solves challenges that have existed for many years. First, electrification substantially reduces the environmental impact of outdoor power equipment. In one recent study, the California Air Resources Board (CARB) estimated that a few hours of running a small mower released emissions comparable to an average automobile completing a four hour drive from Los Angeles to Las Vegas. Second, consumers are looking for ways to reduce the amount of noise produced when landscaping crews use tools such as blowers, trimmers, chain saws and snow throwers. Husqvarna recently conducted a survey of U.S. consumers, and 57% said they would pay more for a landscaper that uses quieter electric outdoor power equipment.



Growing regulation – Regulators are increasingly turning their attention to the emissions impact of outdoor power equipment. In addition to exhaust, evaporative emissions generated when harmful gasoline vapors gradually permeate commonly-used fuel tank materials, such as high density polyethylene (HDPE), are facing more stringent regulations.



Product End of Life – Leading outdoor power equipment manufacturers are more closely examining strategies for product end of life reuse and recycling. Surprisingly, advanced thermoplastics can play a role here too. Unlike thermosets or rubber, today's engineering plastics offer performance and sustainability since they are 100% recyclable.



Thermal management – When replacing metal, the performance of a thermoplastic material under heat becomes a key consideration, particularly for components in close proximity to the internal combustion engine or within lithium ion battery packs. While some materials might perform well at first, it is important to study the performance of the material throughout the product lifecycle.

Landscapers and Green Tech Survey

65%

of consumers who have a lawn would choose a landscaper who uses eco-friendly outdoor power equipment over one who doesn't.



57%

of consumers would pay more for a landscaper who uses quieter outdoor power equipment.



72%

of consumers would support companies that use eco-friendly outdoor power equipment over those that don't.



71%

of consumers believe companies that choose eco-friendly outdoor power equipment should receive tax benefits.





Advanced material selection for outdoor power equipment

The combination of end user expectations for electrification, quiet operation, performance and sustainability in the outdoor power equipment industry is increasing the need advanced material science. For years, DSM has partnered with the world's leading outdoor power equipment manufacturers by offering a broad portfolio of advanced material solutions and application development expertise. Some examples in outdoor power equipment include:

Akulon® PA6/PA66

Akulon is a versatile family of polyamide materials (PA6 & PA66) used in a wide array of applications, such as handles, cosmetic covers and powertrain applications. Akulon Fuel Lock leverages the unique properties of Akulon PA6 to create a thermoplastic solution for fuel tanks that is easier to process and provides a superior evaporative emissions barriers versus monolayer HDPE.

Arnitel® TPC

Arnitel is an advanced thermoplastic copolyester (TPC) with a very unique molecular structure. It combines hard and soft segments to deliver flexibility and strength, which delivers properties similar to rubber in a fully recyclable thermoplastic.

EcoPaXX® PA410

For manufacturers looking to drive sustainability without compromising performance, EcoPaXX is a popular solution. It uses the unique properties of the castor bean to create a bio-based nylon with excellent mechanical performance, chemical resistance and hydrolysis resistance.

ForTii® PA4T/PPA

ForTii leverages advanced polyphthalamide (PPA) chemistry with high amide density, creating a polymer with best-in-class strength, chemical resistance and heat resistance. This makes it an ideal solution for metal replacement applications, particularly when heat resistance is a challenge.

Stanyl® PA46

Used in more than 80 percent of vehicles in operation today and most mobile devices, Stanyl is a proven solution for applications that demand a combination of mechanical strength and heat resistance. Its properties make Stanyl a popular material for complex systems such as gears, actuation systems, connectors and powertrain parts.

Xytron™ PPS

Xytron is a polyphenylsulfide (PPS) designed for some of the most challenging applications. It combines mechanical strength, chemical resistance and hydrolysis resistance with superior weldline strength. This makes it an ideal solution thermal management systems and other applications that demand long-term material performance.

To learn more about DSM's material solutions for turf care, visit [DSM.com/EngineeringMaterials](https://www.dsm.com/EngineeringMaterials) or contact us by visiting [DSM.com/contactdem](https://www.dsm.com/contactdem).



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