Enhancing performance in polyamides

Innovations in additives for polyamide compounds include sustainable options, flame retardant developments and a solution for warpage. ***Chris Saunders*** *reports on new products*

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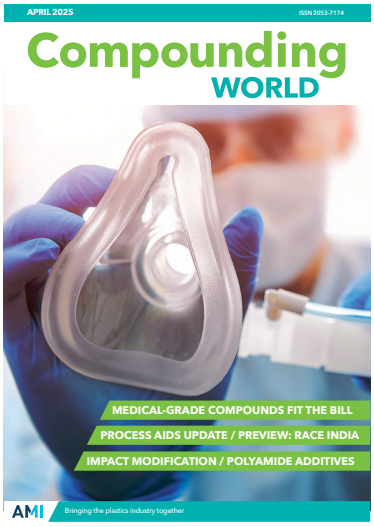

Compounding World is a free-to-read monthly global magazine for polymer compounders and masterbatch producers. It covers developments in plastics, additives, and compounding technology, as well as market trends and industry news.

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- Engineering toughness: new impact solutions
- Enhancing performance in polyamides

The careful selection and use of additives play a crucial role in enabling polyamides (PA) to meet diverse demands across a wide range of applications including those in the automotive, electrical, industrial, and consumer industries. These additives are becoming ever more sophisticated, allowing the tailoring of properties which improves performance in demanding environments and ensuring polyamides remain a versatile and indispensable class of polymers in engineering.

Italy-based **Greenchemicals**, a specialist in flame retardant additives, has acquired Polichem, an Italian company specialising in the supply of PA additives, including nucleating, clarifying, mould release agents, impact modifiers, PA chain extenders, IV enhancers for PET, dispersing molecules, and high-performance stabilisers. Through the merger, Greenchemicals will also add Polichem's additives for improving the quality of mechanically recycled polymers to its portfolio. Greenchemicals, based in Desio, will take over operations of Polichem's production site and lab in Garlasco, both in the outskirts of Milan.

"We consider this acquisition highly strategic, representing a crucial synergy to consolidate our role in the formulation of plastic additives internationally," said Greenchemical's CEO Micaela Lorenzi. "We will widen our offer in terms of customised products for styrenics, polyolefins, and engineering thermoplastic polymers, focusing more and more on sustainability."

German special wax manufacturer **Voelpker**'s new photovoltaic plant was recently put into operation and is making a significant contribution to reducing the use of fossil energy sources and lowering the CO_2 footprint. The company offers montan wax and plant wax-based high-performance additive formulations for PA under the brand names Cevo and Cevo-R. Both Cevo 3110 and Cevo 3105 act as flow improvers and also contain stabilisers which promote a re-polymerisation of partly decomposed PA. This means they can, for example, be used to upcycle agglomerate material based on milled PA fibre waste. ›

Main image: Voelpker's Cevo 3105 reduces friction peaks to ensure polymer chains maintain their integrity over time

	Compound formulation						Flammability test
	PA6 L_V= 2,71 [%]	PA66 L_V= 2,64 [%]	Melamin-cyanurate[1] [%]	CEVO® 3105 [%]	Calcium-stearate [%]	Stabiliser[1] [%]	UL94[2] 1,6mm
PA6 1	86,6	-	12,5	-	0,4	0,5	V0
PA6 2	86,6	-	12,5	0,4	-	0,5	V0
PA6 3	89,1	-	10,0	-	0,4	0,5	V2
PA6 4	89,1	-	10,0	0,4	-	0,5	V0
PA66 1	9,0	80,1	10,0	-	0,4	0,5	V0
PA66 2	9,0	80,1	10,0	0,4	-	0,5	V0
PA66 3	9,0	82,1	8,0	-	0,4	0,5	V2
PA66 4	9,0	82,1	8,0	0,4	-	0,5	V0

IMAGE: VOELPKER

Above: With Cevo 3105 from Voelpker, the dosage of flame retardants can be significantly reduced

Cevo 3105 also has positive effects on shear forces and the flow behaviour of PA. High frictional temperatures during repeated rolling-sliding motion can alter the polymer structure and even lead to the rupture of bonds in polymer chains causing cracks and breakages. Cevo 3105 reduces friction peaks to ensure that polymer chains and sensitive additives can withstand mechanical stresses and maintain their integrity over a prolonged length of time. In addition, it acts as a flow improver and contains stabilisers which promote re-polymerisation of partly decomposed PA.

Flame retarded (FR) PA materials are widely used in demanding electrical and electronic applications. By using Cevo 3105 in PA, the flame retardant classification UL 94 V0 can be achieved while reducing the dosage as it helps to distribute the additive evenly in the polyamide matrix and has no negative influence on the dripping behaviour of the respective test rod. The Cevo range is complemented with bio-based structural twins Cevo 3105-R and Cevo 3110, which correspond structurally to the conventional examples and perform identically. However, the carbon in the Cevo R-series is renewable, making it an option for manufacturers keen to meet sustainability targets.

Flame retardants

US speciality additive supplier **CAI Performance Additives** says antimony trioxide (ATO) has long been used in PA formulations as a key FR synergist, but recent challenges have driven compounders to seek replacements (as discussed in *Compounding World* December 2024 edition). ATO shortages and price fluctuations due to geopolitical and raw material constraints are said to be the biggest factor, with conditions exacerbated by health and regulatory concerns as ATO is classified as a Category 1B carcinogen under Regulation (EC) No 1272/2008 [CLP] and listed in the US NTP 14th Report on Carcinogens. This means compounders, particularly those targeting UL94 V-0 flame retardancy, are facing rising costs and uncertainty around ATO availability, a situation fuelling a search for reliable, lower-toxicity alternatives that maintain fire safety standards while improving sustainability and cost-effectiveness. One such solution is ST-FR322, a FR synergist from CAI Performance Additives designed to replace 30-50% of ATO in PA formulations leveraging a unique intercalation structure.

The company says case studies demonstrate that ST-FR322 can successfully replace 50% of ATO while maintaining UL94 V-0 in PA 6 formulations, enabling compounders to reduce ATO dependency by half without compromising FR performance. This lowers costs while keeping the same processing conditions, and meets critical safety standards with a cleaner, more sustainable formulation.

Unlike traditional ATO-based systems, ST-FR322 offers proven UL94 V-0 performance, significant cost savings, lower toxicity and environmental impact, and reliable supply, all without the problematic regulatory concerns surrounding ATO, says the company. It is designed for easy integration into existing PA formulations and offers improved

Ascend turns to mass balance in PA 66

Last December, **Ascend Performance Materials** announced the successful production of acrylonitrile, hexamethylene diamine, adipic acid and polyamide 66 from feedstocks derived from used cooking oil, expanding its Bioserve portfolio.

The company says the resulting PA 66 has a 25% lower product carbon footprint than PA 66 made from fossil-fuel derived feedstock and notes that using an ISCC Plus-certified mass-balance approach allows for industrial-scale production of sustainable materials without sacrificing performance.

Ascend's production facilities in the US are all ISCC Plus certified to handle bio-based, circular and bio-circular materials.

"We are focused on finding technical solutions for our customers' challenges," said Alex Mihut, Ascend's vice president for performance chemicals.

"Using the mass-balance approach allows us to meet the growing need for sustainable materials at scale while continuing to offer reliable performance and quality."