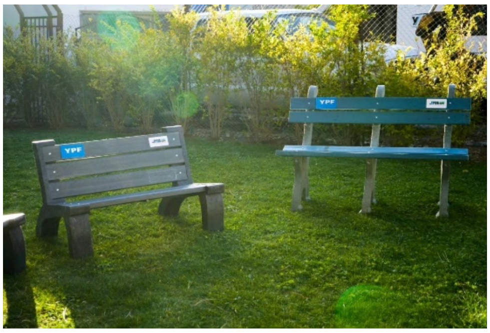
AFFILIATO:

Market Monitoring Newsletter

THE ESSENTIAL NEWS OF ROTOMOULDING WORLDWIDE

Rotomolded benches made from plastic waste.



As part of World Environment Day, the government of the province of Santa Cruz, Argentina, has taken delivery of eight benches made from recycled materials from the companies YPF and JMB, to be donated to organizations and institutions.

The benches, which will be donated to organizations that need them, are made from plastic materials sourced from corks and plastic buckets from YPF's operations, which have been packaged and shredded for recycling. This act highlights the principle of the circular economy, since from plastic waste, a good of prolonged use over time is generated, like the benches. To build these benches using rotational molding techniques, JMB, as an authorized waste treatment operator, treated the material in Santa Cruz to wash and decontaminate it, making it suitable for incorporation into the recycling circuit.

https://noticias.santacruz.gob.ar/gestion/produccion/item/27961-produccion-y-ambiente-recibieron-bancos-reciclados

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AlterMatEco: A new biodegradable natural thermoplastic material

Interview with Christophe Espanel, President of the French company AlterMatEco, which has developed a bio-sourced, biodegradable material based on a compound that combines different types of bioplastics from the PHA (polyhydroxyalkanoate) family, more specifically PHB (polyhydroxybenzoate), with micronized organic matter. This organic material, based on brewer's grains (a co-product of malt-derived beer), was developed with the Green Business Consulting Company (GBCC).

The material, available on the market since November 2022, incorporates between 20 and 30% brewers' grains. PHAs are biodegradable, bio-sourced polyesters, produced naturally by bacteria during a fermentation process from carbon-rich biomass. PHA also has a high biodegradation potential in natural environments (fresh water, seas, wetlands, etc.). AlterMatEco was originally conceived for the manufacture of funeral urns, but it can be used for a wide range of applications. This compound can, for example, be used to make horticultural products and accessories that are left in the ground, or in the building and construction sector to make protective caps. This material can also be colored using "home compost" quality dyes. These fillers also have interesting mechanical properties, and the ability to accelerate biodegradation. On the processing side, the material has proved its worth in injection molding. Trials carried out at the Polyvia technical platform showed that it was easy to develop. The material is not only suitable for injection, but also for rotational molding. It can be recycled several times, notably by recovering the sprues. This was confirmed by recycling tests carried out on PHA by the CT-IPC in Alençon, France, as part of the Nenu2PHAr project. As PHA is very sensitive to hydrolysis during compounding, the spent grains must be dried thoroughly to avoid degrading the material. Other fillers can also be incorporated, notably inorganic fillers such as pozzolan.

https://www.polyvia.fr/fr/innovation-materiaux/altermateco-un-nouveau-materiau-thermoplastique-naturel-biodegradable

Research & Patents

Validation of a 1D dynamic thermal finite difference model for the rotational molding of an amorphous polycarbonate resin.

This study focuses on the heating stage of the rotational molding process. When the mold wall reaches the tacky temperature, free flowing powder starts to adhere, melt, and sinter. In this work, a new modeling strategy is proposed. Compared with the models found in the literature, the model combines the use of a tacky temperature for the adherence of powder, changing boundary conditions, and thermophysical properties as function of temperature and the degree of sintering. The changing boundary conditions are introduced to take into account both wall to air and wall to powder contact. The calculation of the temperature evolution is done by applying the thermal finite difference principle to elements with a fixed polymer mass. The modeling of a uniaxial rotating cylinder is chosen as a case study. The validation is done for an amorphous polycarbonate resin. The performance of the model is evaluated not only by the comparison of temperature-time data as is the case in most literature, but also by the decrease in free flowing powder weight as function of time, visual data from an in-mold looking camera, and through thickness analysis of the molded pieces at various moments in the heating process.

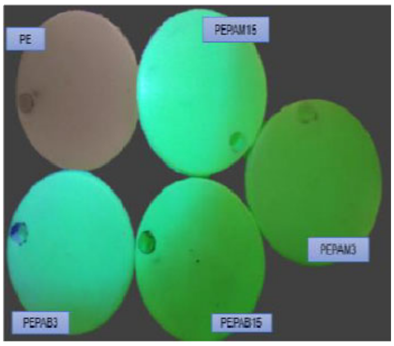
https://4spepublications.onlinelibrary.wiley.com/doi/abs/10.1002/pen.26403

Design and characterization of functional TiO_2-lignin fillers used in rotational molded polyethylene containers

In this study, new TiO_2-lignin hybrid systems were synthesized and characterized by various methods, including non-invasive backscattering (NIBS), scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FTIR), thermogravimetric analysis (TGA), elemental analysis (EA) and zeta potential analysis (ZP). The weak hydrogen bonds between the components, as shown on FTIR spectra, proved the production of class I hybrid systems. TiO_2-lignin systems were found to display good thermal stability and relatively good homogeneity. These newly designed hybrid materials were used to produce functional composites via rotational molding in a linear low-density polyethylene (LLDPE) matrix at 2.5 % and 5.0 % loading by weight of the fillers, namely, TiO_2, TiO_2-lignin (5:1 wt./wt.), TiO_2-lignin (1:1 wt./wt.), TiO_2-lignin (1:5 wt./wt.) and pristine lignin, creating rectangular specimens. The mechanical properties of the specimens were measured via compression testing and by low-energy impact damage testing (the drop test). The results showed that the system containing 5.0% by weight of TiO_2-lignin (1:1 wt./wt.) had the most positive effect on the container's compression strength, while the LLDPE filled with 5.0% by weight of TiO_2-lignin (5:1 wt./wt.) demonstrated the best impact resistance among all the tested composites.

https://www.sciencedirect.com/science/article/abs/pii/S0141813023025205

Linear Low-density Polyethylene Formulated with Photoluminescent Additive for Rotational Molding.



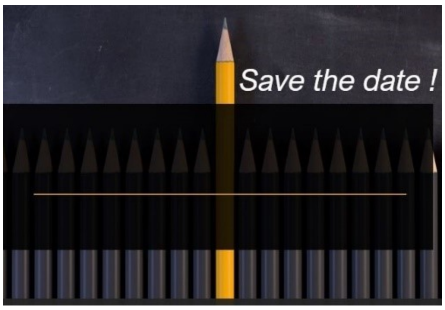
This work studies the properties of Linear Low-Density Polyethylene (LLDPE) doped with strontium aluminate at concentrations of 3% and 15% m/m with possible applications in road safety products manufactured by rotational molding. To this aim, the design and manufacture of a prototype part and the mold for the rotational molding process were carried out. Single-layer parts as well as bilayer parts were manufactured, subsequently, samples of the obtained pieces were subjected to Fourier Transform Infrared Spectrometry (FTIR), Scanning Electron Microscopy (SEM), X-ray Diffraction Analysis (XRD), UV-VIS spectrometry and photoluminescence measurements. The mono-layer and bilayer samples with 15% m/m of strontium aluminate showed the highest decay luminescence times -between 81 h and 92 h-. In the UV-vis fluorescence test, the bilayer piece with 15% m/m of additive showed the highest absorption intensity during the excitation process. The SEM images showed the external surface and the cross section of samples. In conclusion, the rotomolded LLDPE with 15% w/w of strontium aluminate doping could be used as a photoluminescent material for road safety products.

https://www.cetjournal.it/index.php/cet/article/view/CET23100086

Ground lemon and stevia leaves as renewable functional fillers with antioxidant activity for high-density polyethylene composites.

This paper analyzed the effect of fillers obtained by grinding stevia and lemon leaves on the thermal properties and antioxidant resistance of high-density polyethylene (HDPE) composites produced from them. The presented study is a preliminary step focused on the proposal of composites for the rotational molding technology. From the view of the final use of the developed composites, it is necessary to simultaneously increase the resistance of thermo-oxidative stability in the molten state and possibly reduce the environmental impact of final products. Introducing low-processed plant fragments showing even partial antioxidant properties to polyethylene as extracts isolated from them may be a new alternative in producing and modifying polymers formed in this technology. Due to the targeted nature of the rotational molding technology, standard concentrations of fillers were used in the study, which potentially will not cause deterioration of process properties (max. 5 wt%). Differential scanning calorimetry (DSC) and thermogravimetry (TGA) analyzes were carried out to assess the effect of the filler additive on the melting and crystallization of composites and thermal stability. The antioxidant capacity was evaluated by determining the oxygen induction time (OIT) by DSC and supplemented with rheological analyzes carried out in an oxidizing atmosphere supplemented by a comparative methodology of carbonyl index (CI) by Fourier transform infrared spectroscopy (FTIR). Studies have shown that the introduction of 5 wt% of both types of leaves allows for a significant increase in the melt oxidation resistance of composites without substantial changes in their crystalline structure and thermal stability.

https://link.springer.com/article/10.1007/s10098-023-02565-5



1 /13 September 2023
Rototour Nordic 2023

10/12 September 2023
ARMO World Conference 2023

27/30 September 2023
ARM 2023 Annual Meeting

28/29 November 2023

[Master Class AFR]