



Market Monitoring Newsletter

THE ESSENTIAL NEWS OF ROTOMOULDING WORLDWIDE

Rotomod rides the wave of the Olympic Games.



Rotomod, based in Bon-Encontre, France, is a world-renowned rotational molding expert in the design and production of canoes, kayaks and paddles.

Working closely with the French Canoe Federation to develop a 100% French kayak capable of winning gold at the forthcoming Paris 2024 Olympic Games, Rotomod has also just acquired new equipment to develop its industrial subcontracting business.

<https://www.vie-economique.com/actualites/rotomod-surfe-sur-la-vague-des-jo/>

Redline Plastics Awarded Energy Excellence Award.



the state of Wisconsin.

Redline Plastics has been honored as one of ten Wisconsin businesses to receive a 2023 Energy Efficiency Excellence Award from Focus on Energy. Each year, this organization highlights companies that invest in projects to reduce energy consumption in

Redline Plastics has completed several energy-saving projects in the building of its new 250,000 ft² facility in the Manitowoc Technology & Enterprise Campus. Redline Plastics chose to invest in LED lighting throughout the plant. When Redline Plastics moved into its new 117,500 ft² manufacturing facility in 2020, 116 high-efficiency LED lights were installed at the time. Not only does the choice of lighting provide energy savings and efficiency – it creates a bright, well-lit work environment. The rapid growth of the company required a 103,000 ft² expansion in 2021, and once again Redline was able to take advantage of Focus on Energy incentives to install an additional 125 LED lights in the newest part of the plant. Another bonus of using LEDs for the facility is that they emit very little heat. The rotational molding process generates a lot of thermal energy, so it's smart to take measures to manage the temperature – especially in the summer. In fact, each of Redline's rotational molding production ovens has been outfitted with a specialized thermal regulation system that allows heat to be recycled into the facility during the winter months. Cooler air from outside can likewise be brought in to be used in production in the summer months. This feature results in increased energy efficiency year-round. An additional benefit is that the design keeps the environment comfortable for Redlines' 130 Manitowoc employees. According to Focus on Energy, the projects Redline Plastics has undertaken have resulted in enough energy savings to power 2,965 homes each year.

<https://business.chambermanitowocounty.org/news/details/redline-plastics-awarded-energy-excellence-award-05-31-2023>

Research & Patents

Polymer-fibre characterisation and its role in optimum sintering and densification in rotational moulding.



The present work investigated the effect of polymer and fibre properties on the sintering and densification of a rotationally moulded composite part. Previous researchers have concluded that polymer characterisation is fundamental to achieving optimum composite materials processing in rotational moulding.

Nevertheless, a disperse phase during sintering directly impacts the current understanding of how sintering and densification work. Lack of pressurisation during rotational moulding implies an absence of driving forces to strongly bond two materials together as necessary in composite structures. It means that sintering and densification are the fundamental phases in which two or more materials can create an interface that can transmit stresses. The present work focuses on the characterisation of the continuous and dispersed composite phases and how their properties affect the mechanisms of sintering and densification. The effect of polymer-fibre interaction during sintering was investigated by a penetration test based on a variation of the Wilhemly technique (PenTest). Attempts to automate the contact angle measurement proved challenging, so manual measurement proved to be more effective. Sintering results showed

that fibre treatment has a natural effect on the polymer sintering, and the treatment chemistry can optimise adhesion. Glass fibres treated with silane in combination with rotomoulding grade resins proved to be the best fibre-resin combination for the manufacture of fibre-reinforced rotomoulding parts. Finally, results showed that polymer-fibre characterisation plays a crucial role in sintering and densification, and work is ongoing to present conclusions about how sintering and densification affect the full-scale manufacturing process.

(Proceedings of the 36th conference of the Polymer Processing Society - PPS36, 26-29 September 2021, Montreal, Canada ; published in AIP Conference Proceedings, volume 2607, issue 1, 23 May 2023)

<https://pubs.aip.org/aip/acp/article/2607/1/100003/2892430/Polymer-fibre-characterisation-and-its-role-in>

Rotational moulding of poly-lactic acid; effect of plasticization and degree of crystallinity.



This work is aimed to study the suitability of polylactic acid (PLA) plasticized by two cardanol derivatives, i.e. cardanol (CA) and epoxidized cardanol acetate (ECA), in two different processing techniques, i.e. injection molding and rotational molding. Plasticized PLA samples were obtained by melt mixing.

For comparison purposes, poly(ethylene glycole), PEG plasticized PLA was also produced. Initially, the crystallization kinetics of plasticized were studied, highlighting the effect of PEG in increasing the rate of crystallization during cooling. Then, plasticized PLA were processed by the two different techniques, which are characterized by significantly different cooling rates: very fast for injection molding, and very low for rotational molding. For injection molded samples, the cooling rate is much higher than the critical quenching rate, which allows to obtain almost completely amorphous samples at 10 phr of plasticizer. On the other hand, in rotational molding, for PEG, the cooling rate is much lower than the critical quenching rate, which leads to the production of almost completely crystalline samples, showing a very brittle behaviour. The lower critical quenching rate of CA and ECA allowed to produce almost completely amorphous samples also by rotational molding, thus allowing to retain very good toughness of the produced samples.

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<https://pubs.aip.org/aip/acp/article/2607/1/100004/2892454/Rotational-moulding-of-poly-lactic-acid-effect-of>

An analysis of rotationally moulded sandwich structure's repeated impact properties.



Repeated impact properties of fully recyclable rotationally moulded polyethylene (PE) sandwich samples were experimentally investigated in this work. Testing was carried out with an impact force sensor attached drop weight impactor at 20 J to 50 J energy levels.

These sandwich structures used in marine, automotive, large tanks and other applications, are susceptible to small damage due to impact events with floating debris, collisions or friction with other vehicles, crafts etc. in their service life which can grow with time and repeated impacts leading to a catastrophic failure. To avoid this unexpected situation, an in-depth understanding of repeated impact properties of this sandwich structure is essential. The repeated impact properties were analysed in terms of impact force-deflection, maximum impact force, impact damage and the total number of repeated impacts needed for sample penetration. A lower impact energy level showed a higher total repeated impact events to penetrate sandwich samples fully. The maximum impact force vs the repeated impact number figure exhibited three different regions which are related to the damage mechanisms of tested rotationally moulded sandwich samples.

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<https://pubs.aip.org/aip/acp/article/2607/1/100005/2892455/An-analysis-of-rotationally-moulded-sandwich>

Modelling of the heating stage in rotational moulding by using a dynamic 1D thermal finite difference technique.



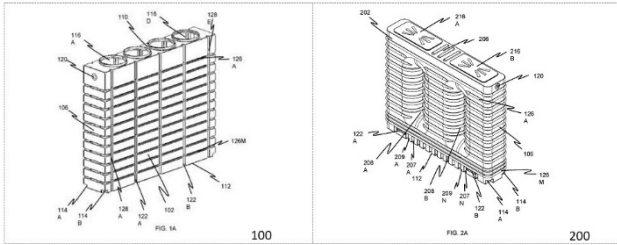
Rotational moulding is a polymer powder processing technique used to make large, hollow plastic products. The heating phase in this process influences both the final product wall thickness distribution as well as the mechanical properties and aesthetical appearance.

In this paper a model to calculate the heat transfer is developed. This is done using a 1D thermal finite difference technique with dynamically changing boundary conditions. Compared to the models found in the literature, the deposition process is done in a discrete manner. Density and thermal conductivity are changed according to the progress of the sinter process using Bellehumeur's equation for the coalescence of two grains. The first part of the paper will focus on a theoretical description of the model, the second part on the experimental validation. A close agreement between experimental data and numerical results was found.

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<https://pubs.aip.org/aip/acp/article/2607/1/100006/2892456/Modelling-of-the-heating-stage-in-rotational>

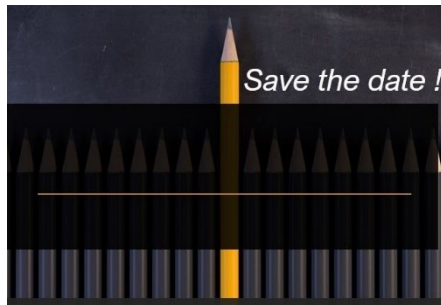
Modular storage unit for modular construction.



Disclosed is a modular storage unit (100, 200) that includes first and second panels disposed substantially parallel to each other; third and fourth panels disposed substantially parallel to each other and substantially orthogonal to the first and second panels; a cavity defined between the first through fourth panels; a plurality of through holes.

The first and second through holes of the plurality of through holes are disposed on the third panel and third and fourth through holes of the plurality of through holes are disposed on the fourth panel. The modular storage unit 200 may be substantially similar to the modular storage unit 100, with like elements referenced with like reference numerals. However, the modular storage unit 200 may include first and second panels 202 and 204 that may be structurally different from the first and second panels 102 and 104 of the modular storage unit 100. In some embodiments, the modular storage unit 100 or 200 may be manufactured by a roto-moulding process. The roto-moulding process may provide requisite strength to the material of the modular storage unit. The roto-moulding process may allow the modular storage unit to exhibit a single-body structure. Further, the roto-moulding process may ensure a uniform thickness of the modular storage unit. During fabrication of the modular storage unit 100 or 200 by roto-moulding process, a number of moulding pins may be used, which may improve the strength of the modular storage unit against bulging or bulge loading. The roto-moulding process for manufacturing of the modular storage unit 100 and 200 reduces the manufacturing/fabrication time for the modular storage unit 100 and 200.

https://worldwide.espacenet.com/publicationDetails/biblio?CC=EP&NR=4183707A1&KC=A1&FT=D&ND=3&date=20230524&DB=EPODOC&locale=fr_EP



25 /27 June 2023

[Rotomould23](#)

1 /13 September 2023

[Rototour Nordic 2023](#)

10/12 September 2023

[ARMO World Conference 2023](#)

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