Patent alert June 2025
Composites

This month's selection in brief

Fiber reinforced plastics or composites remain attractive across industries thanks to their remarkable properties. These same properties render the end-of-life management of these composites challenge. This challenge is being addressed in recent inventions. Next to composite recycling processes and methods, this month's selection also highlights the use of bio-based resins in composite manufacturing and exploring the synergistic effects resulting from combining multiple fibers in these composites.

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Method for preparing a reinforced laminate panel

Patent number: BE1031468 B1

Publication date: 2024-10-29

Applicant(s): HYGI PANEL (https://hygipanel.com/en/)

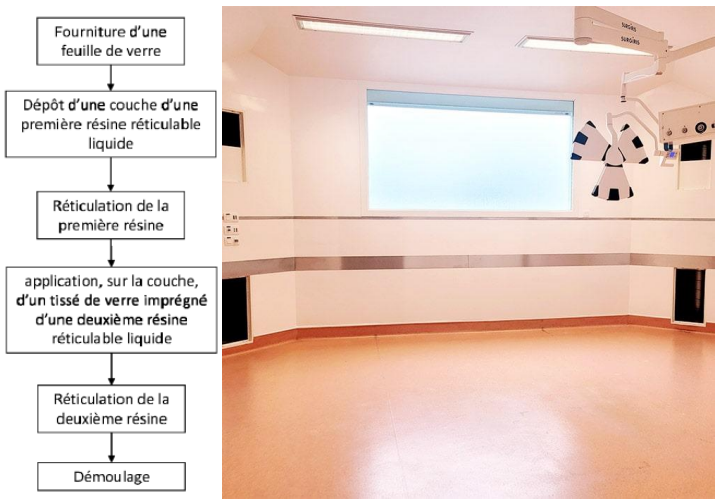
Inventor(s): BONGIOVANNI LORENZO

Summary

The invention relates to a method for manufacturing reinforced laminated panels for use as wall or ceiling coating for example in the food industry, beverage production, laboratories and food processing sectors, requiring a perfectly hygienic working environment and compliance with strict standards. The method comprises the following steps:

a) supply of a glass sheet having a substantially flat and smooth surface,
b) depositing a layer of a first liquid crosslinkable resin on said surface, said resin being selected from isophthalic polyester resins, orthophthalic polyester resins, vinyl polyester resins (or vinyl esters) and mixtures thereof,
c) crosslinking of said first resin,
d) application, on said layer, of a glass woven impregnated with a second liquid crosslinkable resin,
e) crosslinking of said second resin,
f) removal from the mold of the laminated panel obtained.

The resulting smooth and glossy external surface not only enhances the aesthetic quality of the panels but also provides excellent cleanability and bacteriostatic properties, meeting the rigorous standards required in sensitive environments. The process allows us to produce larger panels, minimizing joints and improving installation efficiency. Overall, the invention represents a significant advancement in the field of reinforced laminated panel manufacturing.



https://hygipanel.com/en/healthcare/

Process for recovering the residue of thermoplastic composite materials

Patent number: EP4410512 B1

Publication date: 2024-12-11

Applicant(s): DAHER AEROSPACE

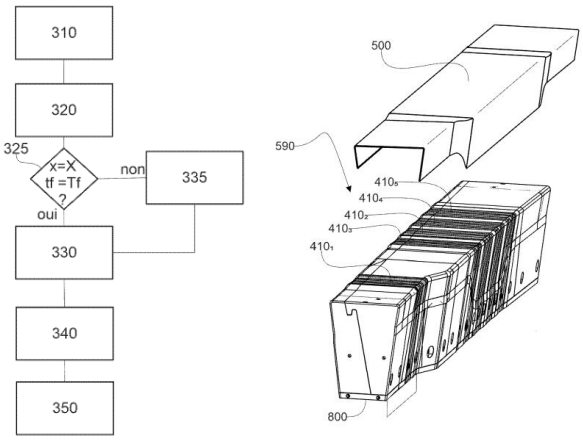
Inventor(s): VAUDOUR JULIE; DAUSSEINS JULIE

Summary

This invention presents a method for manufacturing two composite parts from high-performance thermoplastic polymer materials, particularly in the context of recycling and circular economy practices. The method efficiently utilizes scraps generated during the production of structural parts reinforced with continuous fibers, transforming them into a second composite part with discontinuous fiber reinforcement in the following steps:

a) collecting the scraps (310)
b) grinding the scraps (320)
c) if (325) after grinding, the fiber content x of the ground material is equal to the fiber content X targeted in the granule and if the melting temperature tf of the ground material is equal to the melting temperature Tf targeted for the granule, then compounding is carried out directly from the ground material. Otherwise, in an adjustment step (335), a polymer is added to the ground material during compounding.
d) compounding the ground material (330)
e) manufacturing of the composite part by additive manufacturing of by injection molding (340)
f) assembly in the final composite during an integration step (350)

By employing advanced compounding techniques, the process achieves higher fiber content in the recycled materials than conventional methods, enhancing mechanical properties. The invention addresses the challenges of recycling composite materials, particularly in the aeronautical industry, where both the polymer matrix and reinforcing fibers are costly and must meet strict certification standards. This innovative approach not only minimizes waste but also maximizes the value of high-performance materials, contributing to sustainable manufacturing practices.



Method for manufacturing a fiber-reinforced plastic component

Patent number: DE102023200183 A1

Publication date: 2024-07-11

Applicant(s): VOLKSWAGEN AG

Inventor(s): ANIOL ARMIN; FISCHER FABIAN; TÜRK OLIVER; DERWICH LUKASZ

Summary

This invention presents a novel method for producing fiber-reinforced plastic components using a combination of biogenic thermosetting epoxy resin and natural fibers, particularly hemp bark. The process involves a preparation step to dry the fibers, followed by a homogenization step to create a composition that is then pressed into a semifinished product. This semi-finished product can be stored for over 40 days, allowing for flexibility in production scheduling. The method emphasizes the control of the chemical cross-linking reaction through temperature management, ensuring optimal processing conditions. The resulting composite materials exhibit high mechanical strength and sustainability, making them suitable for various applications in lightweight construction and other industries.

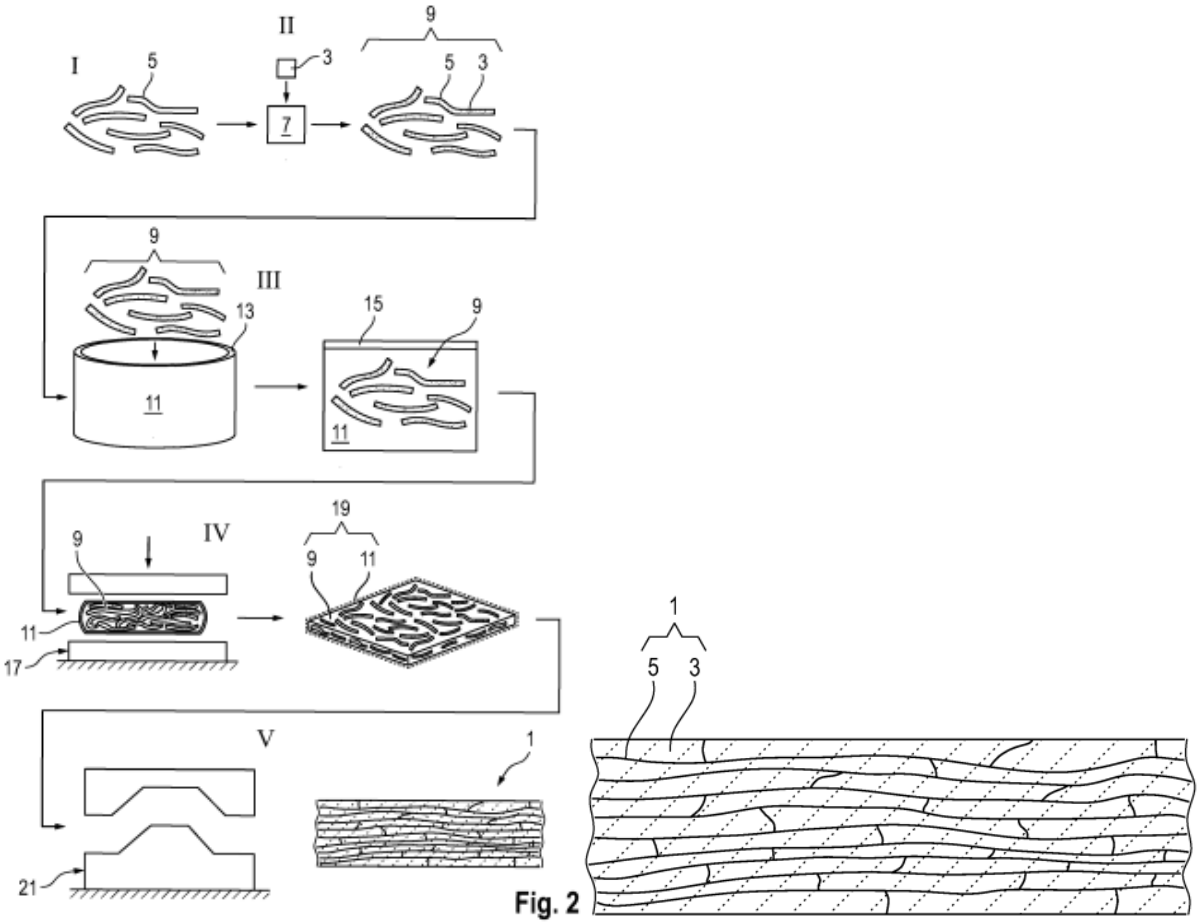


Fig. 2

Nanocomposites of brittle polymeric materials

Patent number: EP4534587 A1

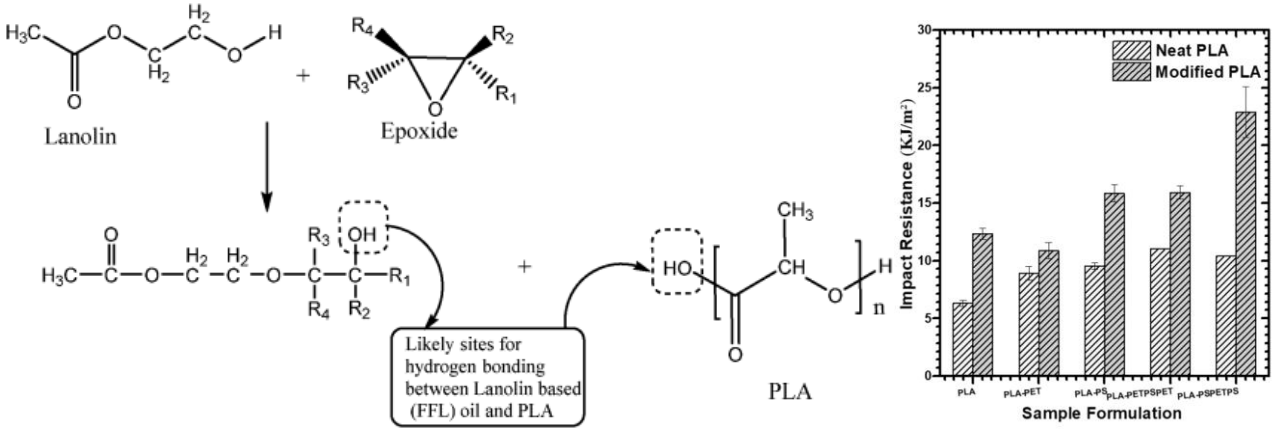
Publication date: 2025-04-09

Applicant(s): UNIVERSITY OF JOHANNESBURG; TSHWANE UNIVERSITY OF TECHNOLOGY

Inventor(s): OKPUWHARA RITA ONOHARIGHO; OBOIRIEN BILAINU; SADIKU EMMANUEL ROTIMI

Summary

This invention relates to a novel process for producing nanocomposites from brittle polymeric materials, particularly focusing on biodegradable options such as polylactide (PLA). The process involves forming sheets or films from the brittle polymer compounded with a biobased plasticizer, followed by sandwiching a mat of electrospun thermoplastic nanofibers between these sheets. The resulting green nanocomposite structure is subjected to elevated pressure and temperature, significantly enhancing its impact resistance compared to neat polymer sheets. The invention not only improves mechanical properties but also supports environmental sustainability by utilizing biodegradable materials and recycled thermoplastics. The resultant nanocomposites are particularly suitable for applications in watercraft construction, providing a viable alternative to conventional materials.



Multi-layer laminate for use in nautical applications and process for its production

Patent number: EP4563329 A1

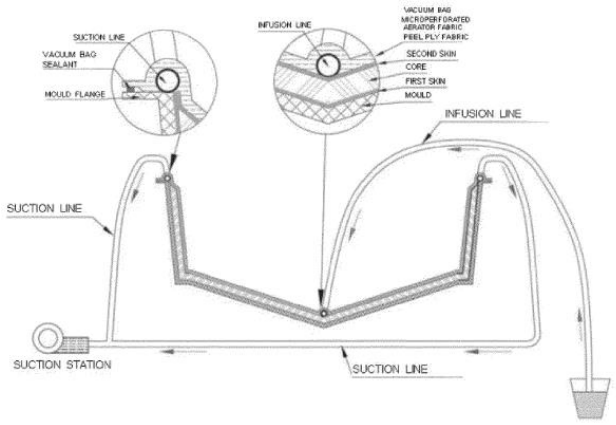
Publication date: 2025-06-04

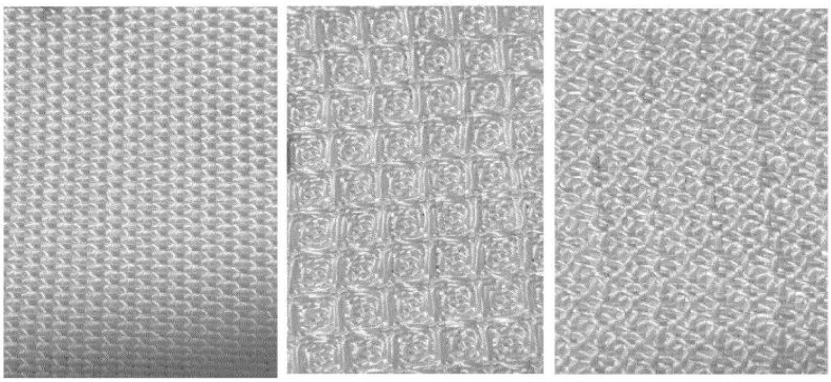
Applicant(s): GUERRA GAETANO; BIANCHI RICCARDO; DAMORA GAETANO; GENOVESE ELIA; NAPPO DANILO; DI PALMA MARIA

Inventor(s): GUERRA GAETANO; BIANCHI RICCARDO; D'AMORA GAETANO; GENOVESE ELIA; NAPPO DANILO; CHINI ANTONIO

Summary

The present invention relates to a multilayer laminate for nautical applications, comprising a thermosetting or thermoplastic polymer matrix and alternating layers of fabric and non-woven fabric. This innovative design reduces the formation of fouling by aquatic organisms, thereby decreasing maintenance requirements and costs associated with watercraft. The laminate maintains high structural characteristics necessary for hull production while being environmentally friendly due to its recyclability and low toxic residue upon disposal. The surface roughness of the laminate is engineered to be lower than that of conventional composites, enhancing its performance in marine environments.





Method, device and computer program for manufacturing elements from chips of recycled elements

Patent number: FR3144036 B1

Publication date: 2024-12-13

Applicant(s): FAIRMAT

Inventor(s): SAADA BENJAMIN; PLANCHE ROMAIN

Summary

This invention presents a method for manufacturing composite material elements from recycled chips, particularly those based on carbon fibers. By utilizing a knowledge base of composition rules, the process allows for the selection and arrangement of chip types to achieve specific desired mechanical properties such as elasticity, strength, and thermal behavior. This method enhances the mechanical performance of recycled composites, making them suitable for demanding applications in various industries. This approach not only contributes to sustainability by recycling materials but also ensures that the resulting products meet high-performance standards, thereby addressing the challenges associated with the mechanical degradation of recycled fibers.

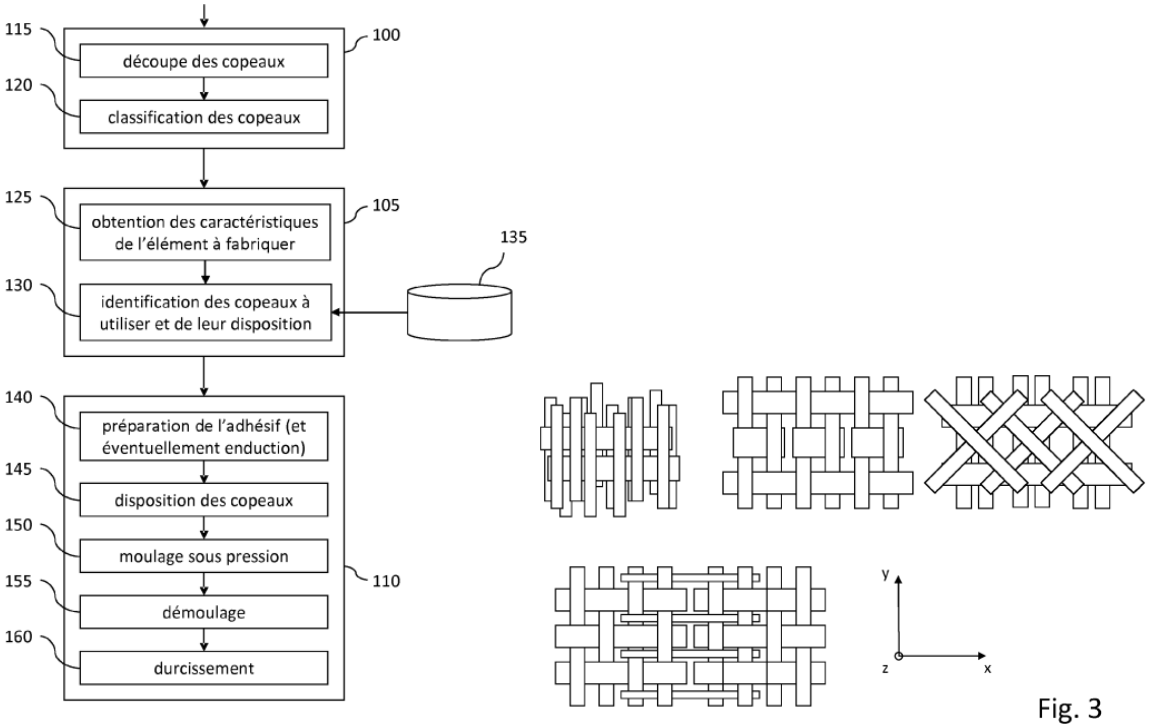


Fig. 3

Method for recycling composite material, composite material, uses thereof and component

Patent number: DE102023209104 A1

Publication date: 2025-03-20

Applicant(s): SIEMENS AG

Inventor(s): HEILMANN PASCAL; HEINL DIETER; LANG STEFFEN; LEIBRECHT FRANK; NTOURMAS FELIX; SEIDEL CHRISTIAN

Summary

The invention presents a novel method for recycling composite materials, particularly fiber-reinforced plastics, which addresses the challenges of fiber recovery from thermosetting matrices. By separating reinforcing fibers from the resin matrix and producing a mat or nonwoven from recycled fibers, the method ensures minimal downcycling and retains the performance potential of the fibers. The process includes optional admixture of defined fibers, standardization, and consolidation techniques such as needling or stitch bonding, followed by resin impregnation. This innovative approach not only enhances the sustainability of composite materials but also allows for the creation of high-quality components suitable for various applications, including energy supply and distribution, automotive, and sanitary sectors. The use of recycled fibers in composite production represents a significant advancement in material science, promoting environmental responsibility and resource efficiency.

The textile preparation of the recycled fibers, with or without the admixture of defined fibers, leads to the production of a mat, a nonwoven or a fiber lay of the recycled fibers by the following process steps:

- harmonization of the recycled fibers, in particular by cutting and/or tearing
- optional admixing of defined fibers
- mat or fleece production from the recycled fibers, in particular by means of e.g. airlay and/or carding technology, for example production of cross fleeces
- matting or fleece consolidation, in particular via needling and/or stitch-bonding of the transverse fleeces produced

The preparation of the recycling fibers includes the following steps:

(a) cutting and tearing techniques, in particular for modifying high performance fiber textile waste

(b) fiber opening and mixing by bale opener, mixing opener and/or in a mixing chamber

(c) fiber sizing by a spraying process.

Microfiber and graphene reinforced polymer matrix composites and methods of preparation thereof

Patent number: WO2024/186665 A1

Publication date: 2024-09-12

Applicant(s): RUTGERS, THE STATE UNIVERSITY OF NEW JERSEY

Inventor(s): NOSKER THOMAS J; YEN HAO-WEI; MAZAR MARK; TEWATIA ARYA S; MCKEE KYLER

Summary

This invention relates to a novel method for producing a microfiber and graphene reinforced polymer matrix composite, which integrates both micro and nano-scale reinforcements to enhance the mechanical properties of thermoplastic polymers. By distributing graphite microparticles into a molten thermoplastic phase and applying shear strain to exfoliate these into graphene nanoparticles, the method allows for the formation of a composite where microfibers are also incorporated. This results in a composite with superior stiffness and strength compared to traditional materials, addressing the limitations of existing polymer composites. The resulting materials exhibit enhanced electrical and thermal conductivity, making them suitable for applications in automotive and aerospace sectors, where weight reduction and mechanical performance are critical.

Material	Graphene wt.%	Carbon Fiber wt.%	Tensile Modulus		Tensile Strength		Material Density (g/cm^3)
			(GPa)	per Density	(MPa)	per Density	
Aluminum (6061-T6)	0	0	68.9	25.5	276	102	2.70
PEEK	0	0	3.5	2.6	80	60	1.33
PEEK (40CF-12G)	12	40	40.5	31.4	198	153	1.29
PA6	0	0	2.0	1.7	49	41	1.19
PA6 (40CF-12G)	12	40	49.7	35.5	180	129	1.40
PP	0	0	2.0	2.2	35	39	0.90
PP (40CF-12G)	12	40	19.2	18.1	81	76	1.06