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iBIB2012/13

International Business Directory for Innovative Bio-based Plastics and Composites

Published by nova-Institute GmbH
and bioplastics MAGAZINE

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Editorial

Welcome to iBIB2012/13, the 2nd edition of the one and only international directory of major suppliers of bio-based plastics, composites, intermediates and green additives worldwide!

The market for bio-based plastics and composites continues to show double-figure growth rates and has now gained true international status.

Make sure you're visible and findable in the bio-based world! The iBIB2012/13 international business directory enables industrial suppliers and customers to get in touch with each other. It contains information on about 80 major companies, associations and R&D organisations from 19 countries on 6 continents. There are 15% more subscribers than for the first issue.

New markets such as bio-based plastics, composites, intermediates and green additives are mostly based on "insider knowledge" and therefore lack transparency. This in turn harms the steady growth of the sector. iBIB2012/13 helps firms and institutes to find the best bio-based solutions available worldwide.

iBIB2012/13 will reach more than 50,000 potential clients via the nova-Institute's huge, worldwide bio-based network. iBIB2012/13 is published as follows:

- The print version (10,000 copies) will be distributed by the publishers and their partners at trade shows, exhibitions und conferences worldwide
- The PDF version will be distributed widely by email and through websites (about 20,000 times)
- The online database includes a detailed index to help you reach your supplier in the most targeted way (about 20,000 single company profile downloads)
- For the first time iBIB2012/13 will also be published as an eBook and as an App (for iPad) (about 10,000 downloads expected).

At **www.bio-based.eu/iBIB** you have free and direct access to the database with more than 100 specific criteria and a complete list of company profiles. The full PDF version is also available free at this link.

Imprint

iBIB 2012/2013
International Business Directory for Innovative bio-based Plastics and Composites
ISBN 978-3-9812027-5-5
15 €

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ftdesign - kreativ Büro
www.ftd-kreativbuero.de

All pictures on the title are from the subscribers of the iBIB2012/13

Edition:
2012-05-01

Publisher

Michael Carus
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Dr. Michael Thielen
Publisher of
bioplastics MAGAZINE

Take a further look at the hundreds of different bio-based solutions for almost every conceivable application and industry sector. The bio-based revolution is already under way. Be part of it!

Potential subscribers:
Make sure you're visible and findable in the next issue, iBIB2013/14. If you are interested in being included in the next issue, please contact dominik.vogt@nova-institut.de

Kind regards

Michael Carus
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of nova-Institute

Dr. Michael Thielen
Publisher of
bioplastics MAGAZINE

P.S.: Partnership between iBIB and Agrobiobase: cross-links and special subscription rates

We are delighted to offer our iBIB customers additional services to support their marketing activities: nova-Institute (Germany) and the French Competitiveness Cluster Industries and Agro-Resources (IAR) in Laon (France) have signed a partnership agreement that links iBIB customers to IAR's Agrobiobase and its Biomaterials database on bioplastics, natural fibres and biocomposites (www.agrobiobase.com/-Biomaterials-database-). Customers who subscribe to both iBIB and Agrobiobase will be automatically cross-linked between both entries. iBIB subscribers will receive a discount on a subscription to Agrobiobase.

Content

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Bio-based Products – The Definition

Within the framework of Mandate M/430 of the European Commission in 2008, the Technical Board of the European Committee for Standardisation (CEN) created the Technical Committee CEN/TC 249 “Plastics” and published the Technical Report “Recommendation for terminology and characterisation of biopolymers and bioplastics” (CEN/TR 15932:2010). In this document the following definitions can be found:

- Biomass: material of biological origin excluding material embedded in geological formations and/or fossilized
- Bio-based: derived from biomass
- Bio-based product: product wholly or partly bio-based. NOTE: The bio-based product is normally characterized by the bio-based content.

The commonly used biomass is starch, sugar, vegetable oils, (hemi) cellulose (timber, natural fibres, straw and other by-products) and special biomolecules such as lignin or natural rubber.

How to measure the bio-based content

The ability to determine the bio-based content of a product is an obvious prerequisite for distinguishing bio-based products and communicating it to the market. Currently, the state of the art in terms of bio-based content determination is restricted solely to determination of biomass carbon content by means of the $^{12}C/^{14}C$ methodology (in analogy to the US-American standard ASTM 6866). By choosing this route, however, one often arrives at unexpected values for the biogenic part so interpreted, which are hard to comprehend at first. How does a material made from 50% PLA and 50% PP become only 36.7% bio-based by measuring the ‘green carbon content’? Due to the fact that in the PLA relatively more oxygen is bound than in PP. But this biogenic oxygen also substitutes fossil carbon. Why shouldn’t it count?

Why not simply label the entire biomass content? This value could be calculated by knowing the chemistry of the material and easily be conveyed in communication with clients. Knowing the detailed biomass content, also the content of biogenic carbon is known, and based on that, the $^{12}C/^{14}C$ ratio can be predicted. With the $^{12}C/^{14}C$ method the concordance of the theoretically determined values with the reality in the material or product can be controlled any time.

Our recommendation: Define, measure and label the entire biomass content as bio-based content. Use the $^{12}C/^{14}C$ method as a quick check of the calculations.

Aware of the importance of finding a solution to these controversial issues, the CEN Technical Board approved in May 2011 the creation of a new CEN Technical Committee, CEN/TC 411 „Bio-based products“, whose aim, among others, consists in developing a standard test method and testing scheme for determination of bio-based content that is not solely dependent on ^{14}C analysis. This methodology should be applicable in different bio-based products, including as a minimum, bio-polymers, -composites, -lubricants, -surfactants, and –solvents.

Your nova-Team

Suppliers

AD MAJORIS S.A.S

Foundation
- The plant was created by a family-owned French group in 1971; AD Majoris was founded in 2002

Turnover
- 15 million €

Employees
- 30 employees

Branches
- Taylor made products with conventional or bio-sourced thermoplastics filled
- High performance specialties and services to various industries like automotive, electrical, appliance, etc.

Key bio-based products
- Maj'Eco® - thermoplastics with natural fillers including coloured, flame retardant and hybrid qualities

Other products
- MAJORIS G® - thermoplastics reinforced with long glass fibres including coloured and flame retardant qualities
- NEALID® - alloys of PP/PA and PA/PP

AD majoris

> when technology imitates nature

Company

AD Majoris is a French company located in Cublize close to Lyon, in the centre of France making a turnover of 15 million € and employing 30 people. Generating around 50% of our sales in around 40 foreign countries, our business is operated throughout our liaison office in Istanbul (Turkey) serving the Middle East markets and a network of distributors in several countries.

With an annual capacity of up to 14,000 tons and more than 40 years of experience on colouring polymers, we produce a broad range of engineering compounds based on polyolefins (PP & PE), polyamides (PA6, PA66, PA6.66), polyoxymethylene (POM), styrenics (ABS, PS), poly phenylene sulphide (PPS), polycarbonate (PC), polybutylene terephthalate (PBT). These qualities can be modified with short glass fibres, with a mix of mineral fillers from 5 to 40%, long glass fibres from 20 up to 60% on polypropylene and polyamide products. We are fully engaged on the development of new products using natural fillers for environmental issues.

Linked to our know-how about flame retardant products we also produce these grades with mineral or glass fibres, with or without halogen content. Our vocation is to Taylor made products on request from our customers to serve automotive, electrical, appliance and many other markets. Our strength is to be flexible on order volume and delivery time. Our R&D Department is ready to study all projects with customers by combining our expertises, our facilities and network of suppliers, consultants and external laboratories.

Services

Using our full flexibility based on our production tools, we Taylor make products following requests from customers in the adapted volume to their needs.. Offering solutions for the industries of specialties, we support the projects of our customers and bring the right advice to create added values on application and challenging the targets.

Focusing on Eco-Conception, we can propose qualities fitting expectations on reduction of weight, on energy consumption during processing and creating less dependence to fossil fuels, using more renewable resources. Based on our expertise to serve the markets, we are committed close to the OEM's with several approvals.

AD majoris

> when technology imitates nature

Products

Our commitment on preserving the planet and our concerns to the environment pushed us to develop along the last 6 years a new approach in innovation by creating conventional and bio-sourced thermoplastics with natural fillers and hybrid solutions.

Our brand Green line Maj'Eco® is offering such possibilities.

Most of our references can be proposed with wood, linen, miscanthus, cork and other natural fibers.

Focusing on reducing the dependence on conventional thermoplastics based on petrochemicals, we developed new formulations using bio-sourced raw materials coming from grafting starch technology. These new qualities offer significant savings, especially on processing temperature and have low carbon footprint (reduction of CO_2 emission by at least 40% compared to polyolefins). Due to our experiences on producing compounds in coloured and with flame retardant stabilization, we designed a new quality based on bio-sourced raw material with natural fillers and halogen-free retardant in coloured version for making several industrial products. Linked to our know-how on manufacturing PP with long glass fibres (our MAJORIS G® range), we developed a new reference using partly bio-sourced raw material with long glass fibres and offering the same mechanical properties with a new image introducing a new ecologic dimension to the MAJORIS G® qualities. Many other Taylor made references have been developed for automotive, appliances, electrical, packaging, sports and others industries. Recently, we created a new hybrid based on MAJORIS G®.

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ARKEMA S.A.

Foundation
- The Arkema Group was created in October 2004 from the reorganization of Total's Chemicals branch and spun off in 2006.

Turnover
- 5.9 billion €

Employees
- 14,000

Branches
- Vinyl Products
- Industrial Chemicals
- Performance products

Key materials
- Bio-based polyamides

Key bio-based products
- Rilsan®
- Pebax® Rnew
- Platamid® Rnew
- Rilsan® Clear Rnew
- Rilsan® HT

ARKEMA
The world is our inspiration

Company

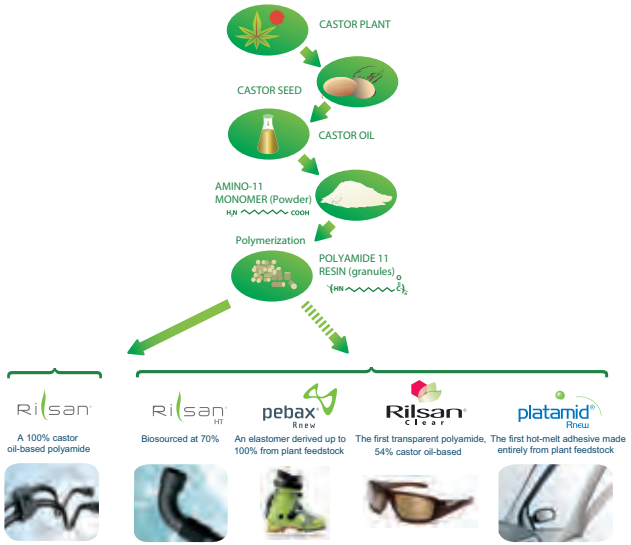
A global chemical company and France's leading chemicals producer, Arkema is building the future of the chemical industry every day. Deploying a responsible, innovation-based approach, we produce state-of-the-art specialty chemicals that provide customers with practical solutions to such challenges as climate change, access to drinking water, the future of energy, fossil fuel preservation and the need for lighter materials. With operations in more than 40 countries, 14,000 employees and seven research centers, Arkema generates annual revenue of € 5.9 billion and holds leadership positions in all its markets with a portfolio of internationally recognized brands. The world is our inspiration.

Even if only 4% of the world annual oil production is used as raw material for plastics, the chemistry of the future will partly result of various polymers and resins derived from bio-based feedstock. Increase the share of renewable raw materials and conserve save fossil resources is a core focus of Arkema's innovation.

Products

Developing chemicals from plants: Bio-sourced plastics today account for 30% of Arkema's technical polymer business, taking up around 2/3rds of its R&D activity. These plastics feature properties that are equivalent or superior to those of their fossil-fuel-based counterparts.

Arkema's expertise in castor oil chemistry for over 60 years with its Rilsan® polyamide 11, 100% derived from this chemistry, recently helped bring out



ARKEMA
The world is our inspiration

four new polymers:
- Pebax® Rnew, a biosourced elastomer up to 90% derived from castor oil
- Platamid® Rnew, the first hotmelt adhesive entirely of renewable origin
- Rilsan® Clear Rnew, the first transparent 54% biosourced polyamide
- Rilsan® HT, an ultra tough high temperature polymer fulfilling today's general need for lighter materials.

To enable its customer to identify products derived wholly or in part from renewable raw materials (over 20% carbon of non-fossil origin), Arkema has devised the «Arkema Renewables» label. The evaluation of the products' renewable carbon content is carried out by an independent body based on the ASTM 6866.

Innovation on sustainability aims at generating around 400 million euros new sales in next 5 years. Alternative energies, water treatment, composite materials and bio-plastics will be the main drivers of this innovation.

Castor oil, a long-running story: Arkema now markets five families of polymers derived from castor oil. The eldest, Rilsan®, a polyamide composed of 11 carbon atoms, was synthesized by French chemists at the end of World War II. Initially used to make synthetic thread to competed with nylon, its applications soon grew to include cast parts and pipes. Today, Rilsan® polyamide-11 resin is employed in high-value-added applications requiring high strength, such as vehicle gas lines and the flexible pipes used in offshore oil extraction. In the last several years, our expertise has enabled us to market four new families of castoroil-based technical polymers. These include Platamid® Rnew, a hot-melt adhesive made from totally renewable raw materials, Rilsan® Clear Rnew resin, the first fully transparent high-performance polyamide partly biosourced, Rilsan® HT resin for engineered parts subject to temperatures of up to 170°C, especially under automobile engine hoods, and Pebax® Rnew resin.

ARKEMA RENEWABLES

Link to Agrobiobase

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Project Leader

ASHLAND INC.

Foundation
- 1924

Turnover
- 6.5 billion $ (2011)

Employees
- 15,000

Branches
- Global leader in unsaturated polyester resins and epoxy vinyl ester resins

Key materials
- Specialty chemicals

Key bio-based products
- Envirez™

Other products
- Natrosol™ Plus 330 rheology modifier
- Aquaflow™ XLS nonionic synthetic associative thickener
- Soyad™ adhesives
- Purelam Fastcure™ laminating adhesive
- Klucel™ hydroxypropylcellulose
- Valvoline Premium Blue™ extreme engine oil
- Valvoline Syn Gard™ FE gear oil
- Crepetrol™ creping additives
- Dimension™ lotionizing additives
- XxtraDura™ GMA cement additives
- Derakane™ epoxy vinyl ester resins

ASHLAND
With good chemistry great things happen.™

Company

Ashland Performance Materials, a commercial unit of Ashland Inc., is the number one global leader in unsaturated polyester resins and epoxy vinyl. Ashland Performance Materials is the global leader in unsaturated polyester resins and epoxy vinyl ester resins. In addition, it provides customers with leading technologies in gelcoats, pressure-sensitive and structural adhesives.

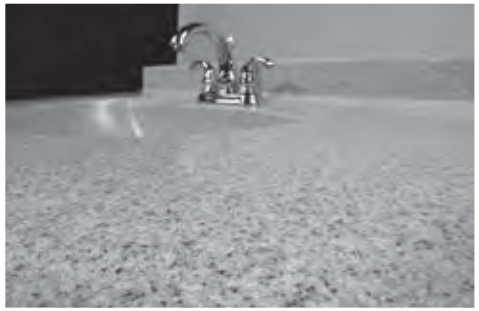
In more than 100 countries, the people of Ashland provide the specialty chemicals, technologies and insights to help customers create new and improved products for today and sustainable solutions for tomorrow. Our chemistry is at work every day in a wide variety of markets and applications, including architectural coatings, automotive, construction, energy, food and beverage, personal care, pharmaceutical, tissue and towel, and water treatment. Visit www.ashland.com to see the innovations we offer through our four commercial units – Ashland Specialty Ingredients, Ashland Water Technologies, Ashland Performance Materials and Ashland Consumer Markets.

Products

Envirez™ Product Line and Properties
Ashland's award winning Envirez resin is the first commercially available unsaturated polyester resin (UPR) comprised of rapidly renewable materials. Envirez resins are manufactured using an innovative patented process. The Envirez technology incorporates a variety of renewably sourced raw materials in the formulation.

ASHLAND
With good chemistry great things happen.™

Envirez resins meet the same performance and processing requirements of 100 percent petroleum-based UPR products and are used in a wide variety of processes and applications within the construction, marine and transportation markets. The Envirez line illustrates both Ashland's leadership in UPR technology and its commitment to introducing new products and services that reduce waste and promote sustainable business practices.



Application Processes
- Hand lay-up/spray-up
- Infusion
- Pultrusion
- Casting
- Solid surface

Markets served
- Transportation and agricultural equipment
- Marine
- Building and construction

Product properties
- Meets the same performance and processing requirements of other unsaturated polyester resins

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Suppliers

BARK CLOTH®_ EUROPE

Foundation
- 1999

Turnover
- 1.23 million $ (2010)

Employees
- 55 in Uganda, 4 in Germany

Branches
- Pioneer, innovation and market leader of systematic bark tree fibre development and production

Key materials
- Tree bark
- Banana fibre, palm fibre, elephant grass

Key bio-based products
- BARK CLOTH®
- BARKTEX®–Standard Finishes
- BARKTEX®–Special Finishes
- Tree bark textiles
- Flexible / non-flexible composites
- Tree bark, banana and palm fibre reinforced bio-based plastics

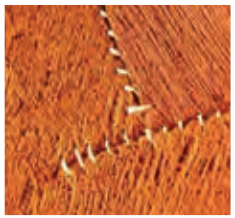
Textiles and Composites from Tree Bark

Innovative Materials Meet Ancient Traditions: Tree bark fleece from Uganda is the most ancient textile of mankind. The DLR German Aerospace Centre is testing it as a matrix in fibre composites, which show extraordinary flexibility and punching tenacity for use in planes. In 2008, it was declared a UNESCO World Cultural Heritage. It is the world's only material which has so far achieved this status.

The Ugandan-German family venture BARK CLOTH® is pioneer, innovation- and market leader of systematic bark tree fibre development and production. The permanently renewable bark is harvested every year without felling the tree. It is the basis for a wide range of textiles and flexible/non-flexible composites, which are manufactured in low-energy, partly CO_2-emission-free processes and distributed under the brand name of BARKTEX®.

Pure and unique surfaces: designers value the expressive character, unique texture and sensual tactility of BARKTEX®. Archaic authenticity: each piece is a unique specimen with it's own story. Exquisitely hand crafted, hence finished with state-of-the-art agents. Only bio-based polymers and biodegradable agents such as other fibres, lignin, fatty acids and natural oils and waxes are used. Production capacity 2011: 220,000 sqm.

Since 2011, distribution partner for BananaPlac and PalmPlac, handmade decorative composites from fibres and bio-PU. Check fibradesign.net and search Google for BananaPlac.



For its efforts, BARK CLOTH® has been honoured with a number of internationally recognized industrial awards for material engineering, cutting-edge design, technical and social innovation. The former development aid project provides hundreds of craftswomen and farmers families with a secure income.

Uses: furniture, automotive/transportation sector, trade fair and exhibition architecture, wall coverings, illumination (lampshades, light sails), cases for household/electric appliances, fashion and footwear, displays and presentation, arts and crafts. Interiors at home, in hotels, restaurants, museums, and yachts.

Green and sexy: extremely fast growing renewable resource. Cradle2Cradle. Zero CO_2 emission processing. Eco certificates EEC 2092/91 for European Union and NOP for USA. Sustainable production on small-scale mixed-cultivation farms. No competition but complementarity to food cultivation. Externally judged high social rating score according to UN Global Compact principles.

Bark up the right tree!
Make your products unmistakable!

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BAVE - BADISCHE FASERVEREDELUNG GMBH

Foundation
- 2011

Employees
- 6

Branches
- Natural fibres industry

Key materials
- Natural fibres

Key products
- Fibre pellets

BAVE – Badische Naturfaserveredelung GmbH was founded in 2011 as partner company of BAFA – Badische Naturfaseraufbereitung GmbH. BAVE specializes in pelletizing natural fibres.

A recent research and development project conducted in cooperation with the Deutsche Bundesstiftung Umwelt (German Foundation for the Environment), the nova-Institute and other members of the industry and research community addressed the crucial issue of how to condition and feed natural fibres so they can be used in injection moulding and extrusion processes. Specifically, the project evaluated, which of the available feeding techniques would optimize gravimetric dosing and dispersion in the compounding process. Pelletizing of natural fibres was eventually found to be the ideal feeding method.

BAVE's pelletizing process provides for variation in the composition of key raw materials and for the addition of various additives. This will achieve optimum pellet consistency and allow for control of the functional properties of the final product, according to customer demand.

We look forward to combining our multi-year know-how in the processing of natural fibres with your innovative ideas.

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Bernd Frank

BEOLOGIC NV

Foundation
- 2000

Employees
- <20

Branches
- Compounding
- Tooling

Key materials
- wood +PVC, PP, PE, ABS, PS, PLA, ...

Key bio-based products
- Ready to use WPC compounds

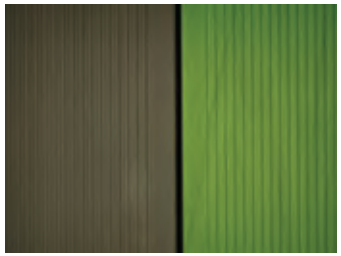
Other products
- WPC extrusion tooling and water baths

Company

Since founding in 2000 as a strictly technologically focused company, Beologic is solely orientated in Wood Plastic Polymers.

Over the years, due to development and our service-focused policy, Beologic faced a significant growth, together with our customers.

Today we find ourselves as market- but much more as technology leader in supplying advanced WPC-compounds.



Beologic has now a capacity of 20,000 metric tons a year with the chance to increase the output dramatically in the coming years.

70% of our WPC production is PVC based. The rest splits between PP, PE & others.

Our main aim is to supply standard sized, top quality WPC Compounds.

We also supply tailor-made material solutions for our partners.

Since 2009 Beologic offers an extensive customer support supplying know-how in R&D, tooling, processing, product development and tool refurbishment

As we are 100% service-focused, the Beologic team acts as a partner for our customers.

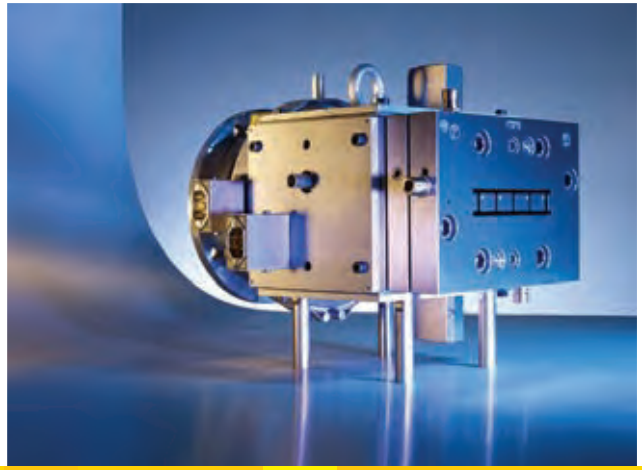
We would be pleased to meet you in the world of Beologic.

We are successful because our aim is to keep solutions simple but never compromise for price.

Products

application	PE	PP	PVC	ABS	PS	PLA
extrusion	●	●	●			●
injection		●	●	●	●	●
co-extrusion		●	●			
foaming			●			
rotomoulding	●					

Suppliers



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BIOAMBER S.A.S.

Foundation
- 2008

Branches
- Wholesale to customers in bioplastics and renewable chemicals
- Polyurethanes
- Cosmetics, Coatings & Resins
- Plasticizers
- Deicers
- Lubricants
- Solvents
- Food & Flavours

Key bio-based products
- Biosuccinic Acid
- Bio-based 1,4 BDO
- mPBS
- Phthalate-free Plasticizers
- PLA/mPBS blends
- C6 chemicals

BioAmber
CHEMISTRY INSPIRED BY NATURE

Company Profile
BioAmber is a next generation chemicals company whose business model of open innovation and partnerships is bringing cost-effective performance materials to market and driving customer innovation in a broad range of applications. Its proprietary technology platform combines industrial biotechnology, an innovative purification process and chemical catalysis to convert renewable feedstocks into chemicals for use in a wide variety of everyday products.

BioAmber is a private, US company with a global presence, based in Minnesota, USA. In addition to its European plant, the only commercial scale plant for biobased succinic acid today, BioAmber is building the world's largest commercial plant for biosuccinic acid in North America (Sarnia, Ontario), together with Mitsui & Co. The Sarnia plant will produce both biosuccinic acid and biobased 1,4 Butanediol (BDO).

Portfolio of Renewable Chemicals
BioAmber offers a portfolio of renewable chemicals based on succinic acid and other C4 chemicals, including 1,4-butanediol (BDO) and esters of succinic acid, as well as a new biopolymer platform based on the modified polybutylene succinate biopolymer (mPBS). mPBS is biodegradable and will be >50% renewable with biobased succinic acid and 100% renewable with biobased 1,4-BDO. mPBS can be used at higher heat distortion temperatures, has better strength and stiffness, and drop-in processability for extrusion and injection moulding.

BioAmber will also use mPBS in a new family of compounded PLA/mPBS resin grades thanks to its joint venture with NatureWorks, which is already offering samples of developmental grades for thermoforming and injection moulding processes. This new family is designed for food service ware applications, expanding the PLA property range in terms of flexibility, toughness, heat resistance and drop-in processability on existing manufacturing equipment. BioAmber is also developing a C6 Platform that will provide biobased adipic acid, bio-caprolactam and bio-HMDA.

mPBS
BioAmber produces modified polybutylene succinate (mPBS), a biodegradable polymer with high heat resistance that feels and performs like high-impact polystyrene, polypropylene or PVC. Use of BioAmber biosuccinc acid in mPBS offers a biopolymer that is not only degradable but also partially renewable. As BioAmber's biobased 1,4 Bio-BDO becomes available, mPBS will be 100% renewable.

Compounded PLA/mPBS
Through BioAmber's joint venture with NatureWorks, a new family of developmental PLA/mPBS compounded resins have been developed for food service ware applications. Based on market interest, further formulated PLA/mPBS solutions will be developed.

BioAmber
CHEMISTRY INSPIRED BY NATURE

Plasticisers
The market is moving to replace phthalates with alternative plasticisers where possible, especially in sensitive applications such as children's products. BioAmber has partnered with Lanxess, a leader in specialty non-phthalate plasticisers to develop a new family of biobased succinate plasticizers.

Polyurethanes
BioAmber's biosuccinic acid can be used to replace petroleum based dibasic acids used in polyester polyols for more environmentally friendly polyurethanes that offer performance benefits in specific applications.

Resins and Coatings
Biosuccinic acid can be used to replace adipic acid in polyester coating resins, powder coatings and unsaturated polyester resins (UPR) to provide environmentally-friendly coatings with a lower carbon footprint.

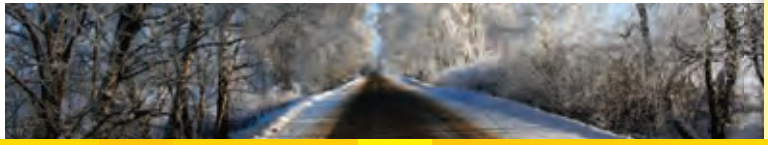
Cosmetics and Personal Care
BioAmber's biosuccinic acid and its esters can be used in wide range of personal care applications; for example, as natural surfactants and emollients.

Deicers
BioAmber's patented biobased succinate salts derived from biosuccinic acid offer environmentally-sound deicing solutions with enhanced corrosion protection.

Foods and Flavours
Succinic acid is used in food applications as a pH regulator and a flavouring agent, among other functionalities. BioAmber's biosuccinic acid offers food and flavours companies a natural alternative to petroleum-derived succinic for enhancing food naturally.

Lubricants
Biosuccinic esters are environmentally-friendly solutions for the lubricants market as base oils and additives in industrial lubricants and metal-working fluids, with improved flowability in cold temperatures and better prevention of oxidation and corrosion.

Solvents
Succinate esters have demonstrated performance in solvents; BioAmber's biosuccinc acid can be used to provide biobased, non-VOC, non-toxic solvents that substitute conventional solvents.



Link to Agrobiobase

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BIOWERT INDUSTRIE GMBH

Foundation
- 2005

Employees
- 15

Key materials
- Functional grass fibres isolated from grass silage

Key bio-based products
- AgriCell[BW] – ‚blow-in' insulation material
- AgriPlast[BW] – a composite material (fibre reinforced plastic) for injection moulding and extrusion techniques
- Products from AgriPlast[BW] are: terrace profiles, boxes, pattress/wall boxes

BIOWERT
bio based industry

Company
Founded in 2005, Biowert Industrie GmbH based in southern Hessen in the Odenwald operates an industrial grass-refinery that is unique throughout the world. A total of 15 employees have signed up to the reasonable utilization of renewable resources to produce products with high added value in the non-food sector. As raw material they use mainly meadow grass from nearby farms.

Method
Biowert developed the patented principle of "Green Biorefinery", in which moist, fiber-containing biomass is fractionated into a liquid and a solid phase. This separation runs completely mechanical without any application of chemicals or organic solvents. All byproducts and waste materials are reused or supplied back to the production cycle. The high degree of automation of the process allows a production on an industrial scale. Stockpiling of raw material (grass silage) allows a year round production. The required process energy is provided by an affiliated biogas plant that runs on waste from the grass-refinery and sanitized food waste from the region. The result of this process is a purified and very high-quality cellulose fiber that is suitable for a variety of industrial applications. The Biowert plant is currently designed for an annual production capacity of 2,500 tons cell fibers.

BIOWERT
bio based industry

Products
With Agriplast[BW] Biowert produces a composite material that reduces the demand for oil in manufacturing-industries of plastic products by up to 75 percent. Depending on purpose the material consists of 40 to 75% cellulose fibers and only 25 to 60% of plastics such as PP, PE, PS or CA. Agriplast[BW] can be colored with any color pigments and easily be processed on conventional extruders and injection molding machines. The final products have interesting properties and are up to 20% lighter than the same form parts made from pure plastics. First commercial applications include for example terrace profiles, stacking boxes or wallboxes for electrical installation.

AgriPlast[BW]

Suppliers

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COMPOSITES EVOLUTION LTD

Foundation
- 2009, Spin-off from NetComposites Ltd

Turnover
- 20,000 € (2009)
- 100,000 € (2010)

Employees
- 5

Branches
- Large experience in spinning, weaving and finishing natural textiles
- Composite materials: processing and applications

Key materials
- Flax
- Flax/PLA
- Flax/PP

Key bio-based products
- Biotex high performance natural composites
- Yarns
- Fabrics – woven and non-crimp multiaxial
- Preconsolidated sheets

Company

Composites Evolution is a supplier of innovative, sustainable materials including the Biotex brand of high-performance natural composite yarns, fabrics and sheets. Biotex is backed up by 130 years of experience in spinning, weaving and finishing natural textiles, coupled with decades of experience in composite materials, processing and applications. This gives Composites Evolution a unique capability in providing high-performance natural yarns, fabrics and preconsolidated sheets tailored to the requirements of composite products and processes.

Material

Biotex natural yarns, fabrics and preconsolidated sheets use a unique Twistless Technology to provide a combination of sustainability, performance and processability not previously seen in composites. For the first time, natural fibre composites can provide high levels of performance and the ease of processing normally associated with glass reinforced materials. There are 3 standard material options: Biotex Flax, Biotex Commingled Flax/PLA and Biotex Commingled Flax/PP.

Sustainability: Flax fibres are renewable and have a low environmental impact during processing. The matrix in commingled Biotex Flax/PLA is also derived from crops, giving a 100% renewable material that can also be recycled or composted at the end of its life.

Performance: Using Twistless Technology, the natural fibres in Biotex yarns are highly aligned to give up to 50% better fibre efficiency over conventional twisted yarns. The yarns are also easier to impregnate, giving improved fibre/matrix interaction and better performance.

Processing: The twistless fibres in Biotex yarns allow fast wet-out and impregnation. Biotex Flax/PP and Biotex Flax/PLA commingled materials include an intimate blend of the reinforcement fibre and matrix polymer for easy processing by vacuum consolidation or press moulding.

Typical Properties

Property	40vol% woven Flax/PLA	40vol% woven Flax/PP	33vol% woven Flax/UP	30vol% UD Flax/UP
Density (g/cm³)	1.34	1.13	1.33	1.32
Tensile modulus (GPa)	13.2	8.1	7.2	18.8
Tensile strength (MPa)	102	56	68	174
Elongation (%)	1.6	1.5	2.5	1.5
Charpy impact (kJ/m²)	33	27	28	

Applications: Biotex materials are suitable for semi-structural and decorative applications in a wide range of sectors including automotive, building & construction, marine, sports & leisure and consumer goods.

Products

Yarns: Biotex yarns are designed specifically for composites and are available in a range of linear densities. They are suitable for processes including filament winding and pultrusion.

- Yarn linear density – 250tex (standard), 125–2000tex (on request)

Fabrics: Biotex fabrics are available in a range of weave styles and fabric weights. They are suitable for processes including hand lay-up, vacuum infusion, RTM and thermoplastic composite processes.

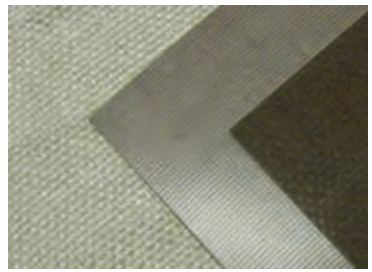
- Woven fabrics – 2x2 twill, 3H satin, 4x4 hopsack (standard), others (on request)
- Non-crimp fabrics – unidirectional, biaxial (standard), others (on request)
- Fabric weight – 400–550gsm (standard), 250–800gsm (on request)
- Fabric width – 1.25m (standard), up to 3m (on request)

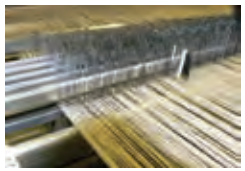
Preconsolidated sheets: Biotex Flax/PLA and Flax/PP can also be supplied as preconsolidated sheets in a range of thicknesses. They can be formed to shape by heating and stamp forming in matched press tools.

- Sheet thickness – 0.4–2.8mm (standard), others (on request)

Composition

- Flax
- Flax/PLA – 40% flax by volume (standard), others (on request)
- Flax/PP – 30% & 40% flax by volume (standard), others (on request)





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DUPONT

Foundation
- Founded in 1802

Turnover
- 31.5 billion $ (2010)

Employees
- Approx. 67,000

Branches
- DuPont Performance Polymers

Key materials
- DuPont Renewably Sourced Material Solutions

Key bio-based products
- DuPont™ Sorona® EP Renewably Sourced thermoplastic polymer
- DuPont™ Hytrel® RS Renewably Sourced thermoplastic elastomer
- DuPont™ Zytel® RS Renewably Sourced long chain nylon

The miracles of science™

Company

DuPont - Driving inclusive innovation to help solve the world's greatest challenges

Founded in 1802, DuPont puts science to work by creating sustainable solutions essential to a better, safer, healthier life for people everywhere. Operating in approximately 90 countries, DuPont offers a wide range of innovative products and services for markets including agriculture, nutrition, electronics, communication, safety and protection, home and construction, transportation and apparel.

As the world's population grows - it passed the seven billion mark this year - we face unprecedented challenges. Solutions to many of them can be found in DuPont science. But providing for the food, energy and protection needs of a growing population will require more than this alone. We are therefore building alliances with people, companies, governments and organizations around the world in an effort to improve the lives of people everywhere. That's how DuPont thinks and works today.

Products

DuPont Performance Polymers provides its customers with innovative polymer science solutions for injection molding, extrusion and blow molding technologies as well as expert application development assistance to enhance the performance, reduce the total system cost and optimize the sustainability of their products. Key market segments include: automotive, material handling, healthcare, energy, electrical/electronic components, hand held devices, appliances, sporting goods and consumer products.

Embracing the Era of Renewability

DuPont Performance Polymers has established itself as the industry leader in high performance renewably-sourced and sustainable polymers with a broad and rapidly expanding portfolio of products.

Unique material solutions meet today's sustainability challenge

By tapping innovative technology and strategic partnerships, DuPont has created novel methods of manufacturing high-performance materials from renewable resources. This new generation of materials, derived from biomass instead of petroleum, reduces the environmental footprint without compromising performance. The versatile offering includes several families of SORONA® EP PTT renewably sourced polyester, HYTREL® RS renewably sourced thermoplastic polyester elastomer, and ZYTEL® RS renewably sourced long chain nylon products.

Renewably sourced materials from DuPont can help reduce dependence on petroleum and reduce the net production of greenhouse gases … all

The miracles of science™

without compromising performance.

Sorona® EP renewably sourced thermoplastic polymers are PTT polyesters with 20% to 37% renewably sourced materials (by weight). Sorona® EP thermoplastic polymers are PTT polyesters made with a renewably sourced propanediol (PDO) made from technical starch. Sorona® EP thermoplastic polymer starts with thebasic Sorona® polymer chemistry and then uses a proprietary formulation technology to create high-performance engineering polymer resins.

Hytrel® RS renewably sourced thermoplastic polyester elastomer contains between 20% and 60% renewably sourced materials with all of the performance characteristics of traditional Hytrel®.Hytrel® RS thermoplastic elastomer bridges the gap between rubber and rigid plastics, and provides all of the performance characteristics of traditional Hytrel®, while using renewably sourced polyether glycols made from non-food biomass.

Zytel® RS renewably sourced long chain nylons, containing 63% to 100% renewably sourced content, comprises all products based on PA1010 and PA610, including their copolymers and their alloys with other polymers. The Zytel® RS product family is made with renewable content that comes from sebacic acid which is derived from castor oil. Castor oil is one of the most versatile, non-food competing natural products. Zytel® RS completes the range of typical flexible polyamides with additional advantages of superior chemical and hydrolysis resistance and very good temperature resistance.

DuPont™ Renewably Sourced™ Materials*

Link to Agrobiobase

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Renewably Sourced Performance Polymers

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Suppliers

EVONIK INDUSTRIES AG

Turnover
- 13.3 billion €

Employees
- 34,000

Branches
- Specialty chemicals

Key materials
- Polyamides
- Polyphthalamide
- Polyetheretherketone

Key bio-based products
- VESTAMID® Terra - bio-based polyamides

Other products
- TROGAMID®
- VESTAKEEP®

EVONIK INDUSTRIES

Company

Evonik, the creative industrial group from Germany, is one of the world leaders in specialty chemicals. Its activities focus on the key megatrends health, nutrition, resource efficiency and globalization. Reinforced with materials such as bamboo fibers, regenerated cellulose, or abaca, the bio-based polyamide molding compounds in 2010 about 80 percent of the Group's chemicals sales came from activities where it ranks among the market leaders.

Our business line High Performance Polymers is specialized in manufacturing customized products and systems. We have been producing high-performance plastics for over 40 years.

Evonik has recently added a group of bio-based polyamides to its VESTAMID® family. The polymers, sold under the VESTAMID® Terra brand name, are based on monomers produced partly or entirely from fatty acids. The most important source is currently castor oil, obtained from the seed of the castor oil plant, which is not used as food or animal feed, so its cultivation does not compete with that of food crops. Evonik is also forging ahead with the development of further polyamides from renewables based on palm kernel and rapeseed oils. One of the driving forces for the development of bio-based polymers at Evonik is the company's own demand for more resource efficiency and greater sustainability for the raw materials used.

In addition to polyamides based on renewable raw materials, Evonik has also been producing polyamide 12 and 612 compounds and polyamide 12 elastomers (PEBA) for about 40 years, and, more recently, polyphthalamide compounds all under the VESTAMID® brand name. Major manufacturers have been using all these materials for decades.

Material

People assume that natural fibers automatically mean less convenience or worse performance. The natural fiber-reinforced VESTAMID® Terra proves that this is not the case. Reinforced with materials such as bamboo fibers, the bio-based polyamide molding compounds have outstanding mechanical and physical properties and are in no way inferior to other engineering plastics. Thanks to their lower carbon footprint than exclusively petroleum-based polyamides, VESTAMID® Terra products make a significant contribution toward conserving fossil fuels and reducing the greenhouse effect. This is something that has been confirmed by TÜV, Germany's Technical Inspection Association.

Demand for organic materials has increased significantly over the last few years, due to continuously rising prices of petrochemical raw materials and customer concerns regarding sustainable protection of resources. With VESTAMID® Terra we are respecting customers' wishes and offering a bio-based alternative for high quality polyamide components such as are used in sports equipment, electronics, and automotive construction.

EVONIK INDUSTRIES

Products

Evonik currently offers three types of bio-based polyamides: VESTAMID® Terra DS is a 100% bio-based polyamide 1010, VESTAMID® Terra HS is a 62% bio-based polyamide 610, while Terra DD can be a 45% or 100% bio-based polyamide 1012 depending on the monomer source. Each type is available in several different viscosities as well as glass fiber-reinforced variants. Different natural fiber reinforced products are under development and can be supplied upon request. The DIN CERTCO organization for conformity assessment confirms the conformity of all VESTAMID® Terra grades.

VESTAMID® Terra molding compounds are semicrystalline and are thus distinguished by high mechanical strength and good resistance to chemicals and stress cracking. They also have high to very high heat deflection temperatures and a low absorption capacity for water, so that the good mechanical properties are retained even at high humidity. These compounds can be processed on all injection molding machines adapted for polyamide and are also suitable for filament production.

Bio-based polyamides can be used even for extreme applications. One polymer capable of particularly high performance is VESTAMID® HTplus a polyphthalamide (PPA) that permanently resists external temperatures over 180 °C. It is used, for example, as a charge air duct in turbochargers. In the Lotus Exige sports, for example, VESTAMID® HTplus reduced the weight of the charge air duct by half compared to the metal duct, and also improved the flow properties - saving fuel and minimizing CO_2 emissions.

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FKUR KUNSTSTOFF GMBH

Foundation
- 2003

Branches
- Compounds
- Biodegradable & compostable resins
- Bio-based resins

Key materials
- PLA-blends for extrusion and injection moulding
- Cellulose blends for injection moulding
- Natural fibre reinforced plastics
- Green-PE Compounds based on Braskems Green-PE

Key bio-based products
- Bio-Flex®
- Biograde®
- Fibrolon®
- Green PE and Terralene®

FKuR Kunststoff GmbH (Kurzportrait)

With the slogan "Plastics – made by nature!" FKuR Kunststoff GmbH was incorporated in 2003. In cooperation with the Fraunhofer Institute UMSICHT, Oberhausen, FKuR has developed a wide range of biodegradable plastics primarily made from renewable resource materials.

Generally, raw bioplastics (starch, PLA, PHA, PBS and others) are not easy to use on conventional plastics processing machinery. Only by smooth compounding processes and special additives mixtures it is possible to process the resulting blends as standard plastics.

Besides their well-established product lines Bio-Flex®, Biograde® and Fibrolon®, FKuR provides now new custom-made green polyethylene compounds with the brand name Terralene® which are based on Braskem's Green PE.

Biomaterials

Bio-Flex®

Biopolymers from the Bio-Flex® family create outstanding opportunities for your products. They provide you with the freedom to design a sustainable product for the applications that your customers require. Within the Bio-Flex® product line we provide different solutions for blown- or cast film, injection moulding, thermoforming as well as blow moulding applications. Bio-Flex® resins have the following strengths and properties:

- 100% drop in solution and ready to use resin
- Processable on standard plastics processing machinery
- Wide window of processing temperatures
- Certified as compostable to EN 13432 and ASTM D 6400 (depending upon blend)
- Food Approved to EC Directives and FDA (depending upon blend)
- High content of renewable resource materials – up to 90% (depending upon blend)

Biograde®

Biograde® are cellulose based blends particularly applicable for injection molding. Biograde® resins generate added value as they offer sustainable solutions of outstanding quality for your applications. Biograde® resins have the following strengths and properties:

- 100% drop in solution and ready to use resin
- Processable via injection moulding, sheet extrusion as well as thermoforming
- Good heat resistance (> 100°C Vicat A)
- Characteristics similar to PS/ABS (depending on grade)
- High surface gloss and smoothness
- Certified as compostable to EN 13432 and ASTM D 6400 (depending upon blend)
- Food Approved to EC Directives and FDA (depending upon blend)

Fibrolon® (natural fibre reinforced compounds - WPC)

With the brand name Fibrolon® FKuR develops natural fibre reinforced compounds (wood – plastics – composites, WPC), which unlike many other WPC can be injection moulded without problems. It is possible to convert Fibrolon® into complex profiles, panels and hollow profiles and/or into components for automotive interior. Fibrolon® compounds are characterised by a high strength and stiffness comparable to wood. Whereas the F and S series is made exclusively from biodegradable components, the P series uses a conventional polypropylene as matrix.

Terralene®

Under the brandname Terralene® FKuR provides tailor-made Green PE compounds following the customer wishes. In contrast to traditional polyethylene the ethanol used for Green PE and Terralene® is derived from brazilian sugar cane rather than from crude oil. Through the use of this renewable raw material, each ton of Green PE is able to capture up to 2.5 tons of CO_2 from the atmosphere, thus helping to reduce greenhouse gas emissions. Furthermore Green PE and Terralene® are 100% compatible with conventional polyethylene having identical properties. Therefore it is also possible to recycle both materials in the same recycling stream.

Suppliers

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GREENGRAN B.V.

Foundation
- GreenGran B.V. was established in 2007, GreenGran BN (HK) Ltd was established in 2008

Turnover
- 1–5 million €

Employees
- 25

Branches
- Bio-composite granules for injection moulding applications

Key materials
- Natural fibre reinforced PP
- Natural fibre reinforced PLA
- PHB
- PLA/PHB compounds

Key bio-based products
- Eight different bio-based composite granules grades for injection moulding applications (see text)

Company
Founded in 2007, GreenGran combines more than 30 years of industrial plastics processing with 15 years of R&D in bioplastics and natural fibre composites. As producer of bio-composite granules for injection moulding applications, GreenGran is ready to serve the bio-based economy. Our innovative materials can economically and technically compete with traditional engineering plastics. Our team of skilled technicians and our sustainable, recycle-able and cradle-to-cradle product range enable us to provide smart and green solutions, matching your requirements. Instead of supplying just granules, we also assist end-users in matching product specs with the right material compositions and we assist operators in setting the right product processing parameters.
Our current production is located in Hong Kong. Increased capacity is projected for 2012, including production in Europe.

Material
The material properties of our granules are such that they compete with engineering compounds. This applies for properties like stiffness, strength, high heat tolerance (HDT). Typical engineering compounds to be displaced are: PP-glassfibre, High Heat ABS, PC/ABS.

Our granules encompass a number of unique qualities, such as:

- Bio-based: partly for PP-based fibre compounds, up to fully for PLA-based fibre compounds; this addresses global policies regarding carbon footprint and oil-dependence
- Recycle able for PP-based fibre compounds and for PLA-based fibre compounds
- Biodegradable for PLA-based fibre compounds
- Flame retardant for specific grades, using halogen-free additives
- Clean fuel pellets at the end of their life cycle (not applicable for flame retardant grades)

At present our standard grades include:

- **N021J** – High melt flow general purpose grade, granules based on polypropylene and natural fibres, which combines high stiffness with high impact strength.
- **N023J** – General purpose grade, granules based on polypropylene and natural fibres, which combines high stiffness with moderate impact strength.
- **N026J** – Engineering grade, granules based on polypropylene and natural fibres, which combines very high stiffness and strength with moderate impact strength. Excellent thermal properties (HDT).
- **F023J** - General purpose flammability grade, granules based on polypropylene, natural fibres, and halogen-free additives, which combines high stiffness with V0 flame retardant properties at thin wall.
- **F023J-SP** - Special purpose flammability grade, granules based on polypropylene, natural fibres, and halogen-free additives, which combines high stiffness with 5VB flame retardant properties and V0 at thin wall.
- **B621J** - Standard heavy-weight waterworks grade, granules based on polypropylene and natural fibres, which combines very high stiffness and strength with moderate impact strength.
- **P021J** - Fully bio-based grade. Granules made from PLA and natural fibres, which combines ultra-high stiffness and strength with moderate impact strength. Excellent processability, good surface finishing, easy to mix with bio-based colour masterbatches.
- **P023J** - Fully bio-based engineering grade. Granules made from PLA and natural fibres, which combines ultra-high stiffness and ultra-high strength with moderate impact strength. Excellent processability, good surface finishing, easy to mix with bio-based colour masterbatches.

In case our standard grades do not meet the needed product requirements, we can develop suitable tailor-made grades.

Being agent in Europe, GreenGran also supplies all PHB-based grades from Tianjin Green BioScience Co., Ltd. (Green Bio).

Contact us for detailed info on material properties, price ranges, and for matching our materials with your bio-based product needs.

Products
Our client's product portfolio is very diverse, covering flame retardant compounds for E&E industry, PP-based NF compounds for industrial construction parts and PLA-based natural fibre compounds for both sustainable and biodegradable applications.

Examples of typical products are Mayamax' BioCharger Family, Anome's Ground Consolidator and Q-DP's Amura Signing.

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HENKEL AG & CO. KGaA

Foundation
- 1876

Turnover
- 15.092 million € (2010)

Employees
- Approx. 48,000 worldwide

Branches
- Adhesives, sealants and surface treatments for consumers, craftsmen and industrial applications

Key bio-based products
- Macromelt- bio-additives for plastic processing

Other products
- Loctite
- Teroson
- Technomelt

Henkel Excellence is our Passion

Company

Founded in 1876, Henkel holds globally leading market positions both in the consumer and industrial businesses with well-known brands such as Persil, Schwarzkopf and Loctite.

Henkel, headquartered in Düsseldorf / Germany, has about 48,000 employees worldwide and counts among the most internationally aligned German-based companies in the global marketplace.

Henkel has three globally operating business sectors:

- Laundry & Home care
- Cosmetics / Toiletries
- Adhesive Technologies

Henkel is the world market leader in adhesives, sealants and surface treatments for consumers, craftsmen and industrial applications.

From our long tradition we have a well-balanced portfolio of International, regional and local brands. Henkel offers a multitude of applications to satisfy the needs of different target groups – consumers as well as craftsmen and industrial businesses.

It all began on June 22, 1923, when the very first delivery of adhesives left the Henkel facility in Düsseldorf, Germany. This historical milestone marked the birth of a business segment in which Henkel is now global market leader.

Products

Macromelt - new, patented Bio-Additives for plastics processing

Environmentally acceptable, petroleum-based packagings were the first step, but the trend is moving irreversibly in a different direction: Oil reserves are dwindling and ecological awareness is steadily growing. Bioplastics and biocomposites are therefore increasingly being called for as alternatives and supplements to the classic, petroleum-based plastics. The new high-performance additives from Henkel offer you the unique opportunity to take the lead in developing new materials that will also meet demanding market requirements for technical and engineering plastics. Macromelt polyamides have a high content of renewables – manufactured from natural oils such as rapeseed oil and Tall oil.

The benefits at a glance

Macromelt products are ideal for technical and engineering plastics, they are suited for extrusion and injection moulding processes. Using the patented Macromelt additives in bioplastics will bring you the following significant improvements:

Suppliers

Henkel Excellence is our Passion

Products

	Macromelt 2420	Macromelt 6239	Macromelt 6786	Macromelt 6797	Macromelt 6900 E	Macromelt 7003
Termination	Acid	Amine	Amine	Amine	Acid	Acid
Bio-based content (%)	>50	82	>50	60	77	86
Softening point (°C)	123-131	133-145	85-95	115-125	135-145	190-200
Heat distortion temperature (°C)	35	<35	<35	<35	<35	60
Melt viscosity (mPas)	(180°C) 3,000	(180°C) 28,000	(210°C) 4,000	(180°C) 4,000	-	-
Melt flow index (g / 10 min)	-	-	-	-	10	95
Low temperature flexibility (°C)	-25	-15	-40	-20	-10	-25
Glass transition temperature (DSC) (°C)	-20	-10	-40	-15	5	-10
Tensile strength (N/mm²)	5,0	4,0	3,0	1,2	12,0	30,0
Elongation (%)	400	600	1,000	300	600	550
Shore Hardness (A)	32 (D)	82	85	64	90	47
Inpact toughness, un-notched specimen (kJ / mm²)	No fracture	No fracture	No fracture	No fracture	No fracture	No fracture

All products: Density 0,98 g/cm³, water absorption <0,5 %

- Improved adhesion to the fibres used, such as hemp, cotton, wood, coconut, glass, etc.
- Gentle treatment of fibres through lower processing temperature (< 200°C) during compounding
- Increase in bio-sourced content
- Reduced water absorption
- Improved feel
- Improved impact toughness

Macromelt, with its mild processing parameters, is well suited for production of natural-fibre composites. It achieves a significantly improved properties profile with outstanding fibre-matrix adhesion. It can also be used for compounding of glass fibre reinforced materials for extrusion or injection moulding processes.

Typical parameters for producing wood fibre reinforced plastics by injection moulding:

- Temperature in the mould: 30°C
- Processing temperature: 155-165°C
- Injection pressure: 250 bar
- Maximum pressure: 620 bar
- Injection speed: 25 mm/s

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Suppliers

H. HIENDL GMBH & CO. KG

Foundation
- 1964

Employees
- 60

Branches
- Plastics engineering
- Compounding
- Tool shop

Key materials
- Wood and natural fibre reinforced plastics

Key bio-based products
- Hiendl NFC® product line

USP (Using Selling Proposition)
- Own tool shop
- Own compounding

Company

H. Hiendl GmbH & Co. KG is a modern producer and service provider in the field of plastics engineering. The company, located in Bogen/Furth near Straubing in Lower Bavaria, employs a little more than 60 staff.

Hiendl makes products and components using injection moulding and extrusion methods. Our designs are partly based on the ideas of our development staff, but partly also on customers' ideas. Besides conventional polymers, we increasingly use natural fibre reinforced plastics. In addition to products and components, Hiendl also develops materials according to precisely defined customized property profiles.

Our development competence reaches back more than forty years. Before Hiendl started to produce plastics, the company had been providing services in various fields of engineering science. The continued successful commitment in that line is reflected in a highly diverse range of product and material developments, supported by numerous patents and utility models.

Innovative Biomaterials

For some years now, H. Hiendl GmbH & Co. KG has been intensively concerned with the development of innovative materials. The central issue in terms of research and development activities has been the quality-oriented use of renewable raw materials. Proof of the success of that commitment is provided by the Hiendl NFC® product line – an array of natural fibre reinforced plastics which, thanks to their versatile property profiles, are excellently suited for a broad spectrum of products.

Products and processes have been originated by our own research and development Department. All process steps, including compounding, are carried out on our own premises by means of modern machinery.

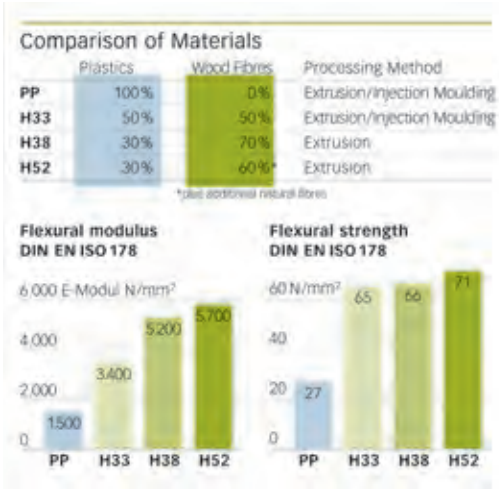
Hiendl NFC® (natural fibre composite) materials consist of synthetic polymers and renewable raw materials. The pioneer product is Hiendl Xylomer®, in which wood is the crucial natural fibre material. Other natural fibres are added for the differentiated design of qualities.

Excellent Qualities: In comparison with alternative synthetic materials, Hiendl NFC® materials stand out above all by virtue of their excellent solidity. With over 70 N/mm², these materials can be more than twice as strong as polypropylene. With appropriate design, rigidity can reach over 5,500 N/mm², which is more than three times the value of polypropylene. By reinforcement with natural fibres, it is possible to achieve rigidity values as we know them from glass fibre reinforced polyamide.

Being very light in weight, Hiendl NFC® materials recommend themselves in many cases as substitutes for aluminium. They have impressive ecological qualities, and their value for money is remarkable.

In comparison with natural source materials, in particular wood, Hiendl NFC® materials convince through their superior formability. Owing to the way they are processed, their surfaces are immediately ready for use, so that no painting or coating is actually required.

Designing Individual Property Profiles: Depending on the raw materials used and on quantity ratios, Hiendl's sophisticated process technology can create a large variety of very specific property profiles. We have been doing research on the use of natural fibres such as hemp, flax, various woods, and many others. The property profile of this ground-breaking composite material is marked both by the properties of the synthetic and natural materials used as well as by the quantity ratios applied.



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JELU-WERK

JOSEF EHRLER GMBH & CO. KG

Foundation
- 1908

Turnover
- 20 million €

Employees
- 70

Key bio-based products
- JELUXYL® product range - pure – grade wood flours
- JELU WPC – wood plastics composites
- Cellulose fibres and powders
- Wood fibres

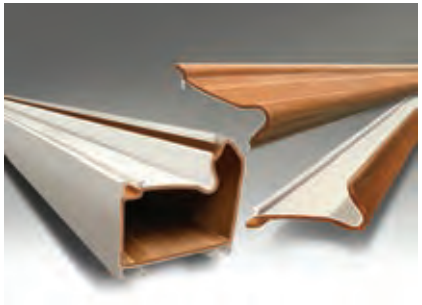
Products made from JELU WPC granulate using the extrusion technique

Company

JELU processes wood fibres and plastics such as polypropylene and polyethylene to produce homogeneous WPC granulates with different filler concentrations. Many years of experience, high-grade contents and our own test series guarantee our customers superb quality.

Products

Several years ago, JELU developed its own process for manufacturing WPC. Depending on the requirements of our customers, we use wood fibres, plastics and additives in different proportions. JELU's innovative composite material is characterised by convincing features such as exceptional product properties, a high degree of design flexibility, outstanding processing attributes and competitive prices. Our WPC granulate has already proved its worth in numerous applications. With our JELUXYL® product range, we also offer pure-grade wood flours of the best quality for the production of individual high-quality compounds.



Profiles made from JELU WPC granulate using the coextrusion technique

The composition of the WPC granulate makes different demands on the processing machines. Our technicians have extensive experience and advise our customers regarding the processing of WPC in their own companies as well as on the manufacture and processing of individual compounds.

Product characteristics

Our compacted WPC granulate is suitable for extrusion, injection moulding, panel pressing and thermoforming. For rotational moulding, only free-flowing and plastic-coated wood particles are used. Depending on the forming techniques and additives used, the finished products are suitable for outdoor and indoor use and have many competitive characteristics:

- Visually appealing owing to their fibrous wood structure
- Mouldable to your needs and in three dimensions
- Dimension-stable
- Sound-absorbent
- Weather-resistant
- Moisture-resistant
- Lighter than plastic products
- Protected from attacks by insects and fungi
- Resistant to rot even in direct contact with earth
- Recyclable

Test results* for JELU WPC granulates

JELU WPC granulates are inspected for standard values by an independent institute. The table below shows the measured data of some WPC granulates. If you are interested, we will be happy to provide more composition options for granulates and their measured data.

JELU – WPC No. 1H: polypropylene, wood content 70%, light beige colour
JELU – WPC No. 2H: polypropylene, wood content 58%, light beige colour
JELU – WPC No. 12H: polypropylene, wood content 50%, natural colour
JELU – WPC No. 19H: polypropylene, wood content 60%, natural colour

Measurement parameters	Standards	Units of measure	1H	2H	12H	19H
Density	ISO 1183	g/cm³	>1,25	1,2-1,25		
Flexural modulus in elasticity	DIN EN ISO 178	MPa	3070	4838	3949	4799
Tensile modulus in elasticity	ISO 527	MPa	2555	4435	4497	5043
Tensile strength	ISO 527	MPa	9	19	44	45,1
Elongation at break	DIN EN ISO	%	ca. 0,35	ca. 0,35		
Brinell hardness (ball diameter 10 mm)	DIN EN 1534	N/mm	x	ca. 115		
Charpy impact strength 23°	ISO	kJ/m²			20,69	13,73
Notched impact strength 23°C	ISO 179/1eA	kJ/m²	1,74	2,95	3,36	3,17
Coefficient of linear thermal expansion 23°C – 80°C, parallel / transverse	ISO 1183-1	10-6/°C				
Flammability UL 94 (d = 1.6 mm)	IEC 60695-10-11	Class	No classification achieved			

*The profiles used for measurements were manufactured using extrusion and injection moulding techniques. The standards are derived from the plastics industry and reflect only part of all information available. Any change in formulation leads to different test results.

Link to Agrobiobase

Headrests made from JELU WPC granulate using the injection moulding technique

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JRS J. RETTENMAIER & SÖHNE GMBH +CO. KG

Key bio-based products
- ARBOCEL®
- LIGNOCEL®

Company
- Over 1,600 employees throughout the world
- 18 plants in Europe, the USA and India
- 3 research and development facilities in Europe, the USA and India

Branches
- Sales, consulting and logistic centres in all the relevant countries

J. RETTENMAIER & SÖHNE GMBH+CO.KG JRS Fasern aus der Natur

Company

JRS balances nature and plastics and has been a fixture for fibrous materials in the plastics industry for decades

Today, renewable natural-based materials have gained a hold in all areas of modern industry. Featuring extensive expertise and technological know-how in the use of plant fibre, Rettenmaier & Söhne sees its role as a mediator between the world of plastics and the wealth of ideas offered by nature – and that applies for all areas of the plastics industry.

Product overview

Innovative technology for wood extrusion: WPC applications are made economically using JRS fibre, compounds and pellets. Optimised and surface-modified ARBOCEL® and LIGNOCEL® wood fibres offer excellent process reliability in both direct extrusion and the compounding for PVC, PP and PE plastics as well as bioplastics.

Cost-effective solutions from a single source: Customer-specific extrusion pellets, individually blended with polymers and wood fibres, are the economical base material for your end products. Process development, optimised logistics and extrusion services characterise the successful collaboration between JRS and customers, for a distinct market edge.

Interesting potential offered by wood injection moulding: New ideas and products characterise this young market. The wood-like touch and environment-conscious marketing outweigh the technical features. LIGNOCEL® compound, with a wood composition of 65–70%, offers a solid basis for the winning of new markets.

Cellulose fibre
Wood fibre
Paper fibre
Grain fibre
Pellets
Compounds

– low dust
– free-flowing
– simple processing
– fast extruding

Suppliers

J. RETTENMAIER & SÖHNE GMBH+CO.KG JRS Fasern aus der Natur

We make the “W” in WPC and much more

Ideally balanced fibre and plastics: JRS fibre products offer a broad spectrum of function and uses. Properly applied and balanced with efficiency and sustained economy. That makes our “quiet stars” from nature’s building box so successful. Use this enormous potential for your products and processing. “Green ideas” applied practically and environment-friendly.

JRS – the research and development partner: JRS’ research and practical know-how are in demand throughout the world. JRS maintains three R&D facilities in Europe, the USA and Asia, building a bridge between many years of experience in the area of fibre application and innovative product development or efficiency-building optimisation of applications. Always near to the actual practice and in close contact with the customer. Use this as a basis for new inspiration and to your technical advantage. In theory and practice!

✔ Improvement of heat resistance

✔ More effective fillers
✔ Improved elastic modulus
✔ Fibre reinforcement
✔ Reduced cracking
✔ Natural appearance
✔ Natural haptic
✔ Optimised costs
✔ Improved dimensional stability

✔ Stabilisation of moulding processes

Link to Agrobiobase

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MIFSUD S.L.

Foundation
- The company dates back to the commercial activities of its founder, Mr Salvador Mifsud Andrés, relative to the marketing of cereal byproducts for stock feeding over fifty years ago (1957). The current company, MIFSUD S.L. was established in 1984

Turnover
- 5 million €

Employees
- 16

Branches
- Plastic filling
- Natural fibers for industry
- Vegetable excipients
- Animal feeding

Key materials
- Cereal byproducts

Key bio-based products
- Rice husk flours in different grain sizes
- Commercial names: CAEX, CAES, CAMI, CAMIS, CACE, CAIMP

Company

MIFSUD S.L. Is a family company located in Tavernes de la Valldigna (Valencia, Spain); it has over fifty years of experience in the marketing of raw materials for the animal feeding area. Included in this ativity, MIFSUD established a Department specialized in the collection, conversion and subsequent marketing of cereal byproducts, among which rice husk for vegetable excipients, natural fibers and plastic industries is most outstanding.

Material

Due to our concern with improvement and innovation, MIFSUD specialized in the manufacture of micronized vegetable flour to be used as excipient in different areas such as veterinary and cosmetic, as well as plastic and chemical industries; after several different physical treatments, flours of high quality and excellent performance are obtained for each application.

Through AIMPLAS (Tecnological Plastic Institute, in Valencia, Spain) MIFSUD has taken part, together with other companies, in the DOLFIN (Development of plastic structures) european project, in order to develop plastic structures reinforced with our vegetable flours. After several studies, results back up the use of our flours as filling in plastics, especially the so called wood plastic composite (WPC), due to the many advantages they offer as compared to other vegetable fillings, for example wood flour, mainly due to its physicochemical properties. The following advantages and qualities of the resultant plastics stand out:

- Great fireproofing, due to the fire-resistence of the flour.
- Good hydrophobic qualities. Its permanent contact with water is even possible, which is a very important characteristic considering that part of these materials remainexposed to elements; moisture does not affect them in the same measure as it does to other types of vegetable fillings.
- Excelent stress resistance and greater thermomechanic resistance than other kinds of vegetable fillings; good insulating properties.
- Possibility to provide very low moisture flours, between 2% and 4%, through an adequate thermic treatment; this is an interesting feature due to the impossibility of achieving flours from other sources with similar moistures.
- Low sintering tendency during plastic manufacture, which facilitates dosage; furthermore it has a lower influence on plastic viscosity than other vegetable fillings.

Products

- CAEX, micronized rice husk. Moisture: 9-10% . Grain size: 342-546 micron.
- CAES, dry micronized rice husk. Moisture: 2-4%. Grain size: 342-546 micron.
- CAMI, micronized rice husk. Moisture: 9-10%. Grain size: 114-342 micron.
- CAMIS, dry micronized rice husk. Moisture: 2-4%. Grain size: 114-342 micron.
- CACE, micronized rice husk. Moisture: 9-10%. Grain size: 50-114 micron.
- CAIMP, micronized rice husk. Moisture: 9-10%. Grain size: < 50 micron.

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MÖLLER GMBH & CO. KG

Foundation
- 1947

Turnover
- 23 million €

Employees
- 125

Branches
- Wood based materials
- Timber product market
- Industrial market
- Building material
- Landscape gardening
- Wholesale

Key materials
- Wood plastic composites (LIGNODUR®)
- Plastics
- Metal

Key bio-based products
- WPC Outdoor Floor Systems LIGNODUR® terrafina floor boards
- WPC Balcony profiles (Floor tiles LIGNODUR® terrafina premium)
- WPC Profiles for noise barriers
- WPC Industrial profiles (doors thresholds)
- Internal window boards LIGNODUR®

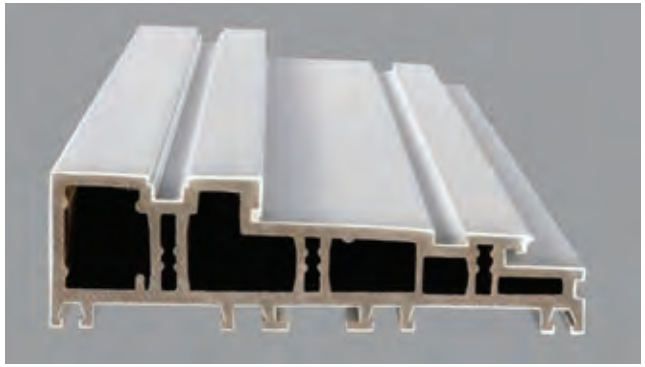
Other products
- Filter frames
- Deco-technique products for interior decoration

Company

Our medium-sized, owner-operated company has been in business for more than 60 years in the metal and plastic industry.

We develop, produce and sell products out of WPC for Outdoor- floor systems, industrial profiles (door thresholds), profiles for noise barriers, internal window boards and other plastic materials for the interior decoration, filter frame systems and packaging accessories for the packaging industry. This wide range of products enables our company to supply a wide variety of customers in the construction, sanitary, furniture, leisure and packaging industries.

Through our expertise and innovation we are much in demand as a system supplier.



The production site for our products made of WPC-material LIGNODUR® is located in Meschede near Dortmund. We have a capacity of 29 extrusion lines on an overall production and stocking area of 30,000 qm; in-house tool design, construction and material preparation are also available.

Möller has subsidiaries in Russia (Moscow, founded in 2004) and Polen (Bydgoczcz, founded in 1997), where internal window boards and profiles for noise barriers are manufactured.

All this allows us to quickly implement your requests.

Material

The main products in the Möller range are profiles out of wood polymer composites. The wood-polymer-composite material LIGNODUR® consists of more than 50 % wood and less then 50 % PVC and additives. LIGNODUR® offers a premium high-tech product that brings together the advantages of wood and the amenities of synthetic material.

We produce eco-friendly in Germany. Only domestic soft wood is used; all our suppliers are PEFC certified and distribute wood from sustainable forest management. Tropical wood is not contained.

The LIGNODUR® terrafina floor boards meet the high standards of the quality label “Qualitäts- und Prüfbestimmenungen für Holz-Polymer-Werkstoffe” of the German quality association “Qualitätsgemeinschaft Holzwerkstoffe e.V.”.

Products

The new noise barrier profile was developed in a joint project with the Academy of Mining and Metallurgy in Krakow, the University of Bydgoszcz Polska zoo and Möller. The WPC-profile parts are weather- and salt-resistant and safe through their simple plug-in system with up to 6 m profile length. In order to achieve maximum acoustic scattering the inner damping capacity of the WPC material was made use of as well as a special surface design. Fields of applications are e.g. soundproofing on roads and industrial plants.

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NATURAL PACKAGING

Foundation
- 2004

Branches
- Organic compostable packaging

Key bio-based products
- Natural Packaging's compostable and recyclable packaging products

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Natural Packaging.
Organic compostable packaging grown from Sunlight, CO_2 and Water is ground breaking!

We supply a done for you service supplying bio-products and packaging using many of the resins contained with in this directory to many markets including foodservice, retails, agricultural products, medical items and fresh packaging.
Natural Packaging has the ability to design, and rapid prototype products for our customers in a matter days. We supply turn key total supply packaging to individual sites (hospitals, airlines, venues ect) or to corporate accounts (retailers) to meet your requirements and specifications.
We at Natural Packaging are changing the way we think and act about packaging and waste.
This is why our company has rethought the end to end approach to packaging and it disposal and we can redeploy your existing resources and re-define your packaging into a sustainable resource.
We are looking to set up licensed resellers in each country and supply more direct corporate accounts.

Materials

Natural Packaging's compostable and recyclable packaging products represent an environmentally friendly substitute for fossil fuel derived plastic packaging. Simply put Natural Packaging provides food and general packaging, agricultural consumables derived from renewable resources such as starch, PLA, sugar, vegetable oils, cellulose, timber, natural fibres, straw and other agricultural bi-products. These bio-based products have the same or improved functionality compared to fossil fuel based packaging with the benefit that our products allow what was a waste stream directed to landfill to become a useful resource being compost or fertilizer.

Products:

- Carrier plastic, bio bags, bin liners
- Garbage bags and food waste bags
- Disposable cups for hot and cold beverage
- Cutlery (single and packaged)
- Clamshells for hamburgers, fish and chips, sushi, salad, and muffins
- Crockery plates, soup bowls cups and saucers
- Bio food grade film
- Coffee and clear cups and lids made from biomaterials
- Meat, food and fresh trays
- Bottles and containers made from biomaterials
- Product premiums for all promotions
- Popcorn, ice cream and food containers, and
- Agricultural clips, string, tape, mulch, film and containers for agricultural produce.
- Retail packaging

Email us with your projects and for case studies.

OLEON NV

Foundation

- Foundation: Oleon and Novance lead the European oleochemistry market with a joint capacity of over 500 000 metric tons of renewable products (fatty acids, esters, glycerol, etc...); subsidiaries of the Sofiprotéol Group

Turnover

- 600 million €

Employees

- 700

Branches

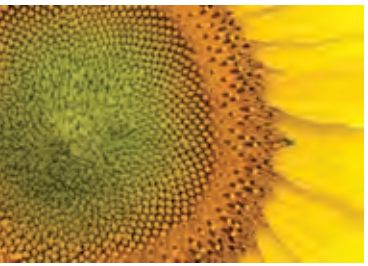
- 6 industrial sites
- Oleon and Novance specialize on complementary activities
- Novance handles research, innovation, and development for high value-added products
- Oleon produces and commercializes the group's broad range of renewable products through its global commercial and industrial network.

Key materials

- Vegetable and animal oils

Key bio-based products

- Radia® range: esters, glycerine, fatty acids, fatty alcohols,dimer acids, technical oils, biodiesel, specialty oleochemical



NOVANCE oleon
Groupe Sofiprotéol

Company

Novance and Oleon are part of the Sofiprotéol Group, formed in 1983 at the initiative of the French federation of oilseed and protein crop producers and today a major agri-food group in France.

The Group's strategy involves maintaining a balanced presence in key fields related to nutrition and the environment: human and animal nutrition, renewable energy and renewable chemistry development.

Novance and Oleon are the two subsidiaries of the Sofiprotéol group specialized in renewable chemistry: as two major players among the leading European companies in this sector of activity, these two companies develop and market over 500,000 tons of vegetable oil-based chemical products, providing solutions which combine technological performance, safety-of-use and eco-friendly standards for industrial applications and end consumers.

Novance and Oleon offer a wide range of renewable products which can be used as alternatives to conventional petroleum-based products: solvents, resins, lubricants, surfactants, emulsifiers, plasticizers, chemical intermediates…

Material

RADIA® OLEOCHEMICALS

The production of the Radia® range is an integrated operation from natural fats and oils derived fatty acids, fatty alcohols and glycerin to their derivatives, specialties and performance chemicals. Governments and industry are today increasingly aware of the combination of technical performance, of lack of toxicity and of environmental protection provided by the use of oleochemicals.

Products

FATTY ACIDS AND ESTERS AS PERFORMANCE ADDITIVES FOR POLYMER APPLICATIONS

The use of relatively small quantities of these additives improve the processability of the polymer as well as the performance of the end product. The demand for plastic products increases constantly.

There are several applications of oleochemicals in plastics. Typical applications for fatty acids, metal stearates or esters are:

- Lubricants (both internal and external) reduce friction in process equipments
- Antistatic agents avoid the building up of electric charges
- Antifogging agents prevent formation of water droplets in film applications
- Plasticizers change the "brittleness" of a polymer
- Stabilizers, dispersers and viscosity regulators

NOVANCE oleon
Groupe Sofiprotéol

Radia® and Radiasurf® esters can be "engineered" to meet the most diverse application requirements. For example they can be made with a well-defined melting point, polarity or surface tension.

BASE OLEOCHEMCALS AS BUILDING BLOCKS FOR POLYMER SYNTHESIS

- BASE OLEOCHEMICALS DIMERS

The specific hydrophobic properties of the dimer fatty acid, make it a unique molecule in polymer synthesis. Dimers are used in polyamide resins (hot-melt adhesives and inks), in polyurethanes for surface coatings (coating of metal coils) and epoxy resins, as dimer alcohols in polyesters or for the production of corrosion inhibitors, etc.

- BASE OLEOCHEMICALS GLYCERIN

The applications of natural glycerin are based on a unique combination of properties: it is a colorless and odorless hygroscopic, non-toxic and non-irritant viscous liquid with a plasticizing and lubricating activity. Glycerin is a major raw material for the manufacture of polyether polyols, which are reacted with polyisocyanates to produce polyurethane foams.

- BIO-BASED POLYOLS

Polyurethane foams, coating, adhesives, sealants and elastomers can also be made from renewable sources. A wide range of bio-based polyols are already available to meet customer requirements in the most demanding applications, including flexible foams (mattress, pillows, car seats...) and rigid foams (insulation).

SAFE TO USE AND ENVIRONMENTALLY FRIENDLY

Oleochemical products developed by Oleon present the inherent advantages of their feedstock, natural fats and oils: non-toxic, non-irritating, biodegradable and environmentally friendly in general. The W.G.K. (Wassergefährdungsklasse) of all fatty esters produced by Oleon is between 0 and 1.

The harmlessness of oleochemicals also ensures that they are extremely well suitable for each step of the manufacture of plastics that come into contact with food.

R&D CENTER

The R&D center is based in Compiègne, France; it employs about 60 researchers and technicians to develop solutions meeting customers' requirements and in partnership with a strong network of public and private partners. The oleochemicals business unit benefits from the Sofiprotéol Group's upstream integration ensuring steady supply of raw materials and competitiveness of the marketed solutions.

Suppliers

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PHK POLYMERTECHNIK GMBH

NPS NEW POLYMER SYSTEMS, INC

Foundation
- PHK Polymertechnik GmbH was founded in 2002
- NPS New Polymer Systems, Inc. in 2009

Branches
- Plastics

Key materials
- Bio-based hydrophobic fillers
- Compounds

Key bio-based products
- Nerolit 100
- NeroPlast
- Nerolit / NeroPlast compounds with different matrix polymers

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PHK - Polymertechnik nps new polymer systems, inc.

Company

PHK and NPS are active in the field of thermoplastic compounds. They serve the market with the same products in different regions of the world. The base region of PHK is Europe and of NPS it is North America. Both companies are technology driven to provide their customers with latest developments in biobased plastic composites. Both companies are active in developing the whole chain of production from the origin of the raw bio material to the use of ready compounds.

USDA CERTIFIED BIOBASED PRODUCT
PRODUCT 100%

Material

Nerolit / NeroPlast is a 100% biobased, hydrophobic, heat tolerant, durable, UV-stable, light weight and good value filler for plastics. It substitutes heavy weight inorganic fillers like talcum, calciumcarbonate or glass making composites lighter and bio friendlier. It adds strength, increases heat deflection temperature and reduces thermal shrinkage. Due to its heat tolerance it can be used with technical polymers like polyamides (Nylons) which is unique for biofillers. Its hydrophobic character makes composite with Nylons less hydrophilic compared to the neat matrix material.

NeroPlast filler has been awarded USDA BioPreferred designation.

Products

Nerolit / NeroPlast is offered as powder with different mesh sizes. For those who have problems with dosing of powders or due to other reasons Nerolit / NeroPlast is also offered as Masterbatch with different matrix polymers like PE, PP or PA 6.

Nerolit / NeroPlast Compounds are ready to use composites for application in injection moulding, profile extrusion or sheet moulding.

Nerolit/NeroPlast is derived entirely from renewable sources.

PHK - Polymertechnik nps new polymer systems, inc.

Lamp holder made by injection moulding of a composite containing 60% Nylon (PA 6) and 40% Nerolit 100.

Nerolit/NeroPlast absorbs ultraviolet radiation and protects polymers from degradation.

Nerolit/NeroPlast can withstand temperatures as high as 300 °C during processing.

Nerolit/NeroPlast is durable against microbial deterioration.

Nerolit/NeroPlast is half as dense as calcium carbonate or talc, and as light or lighter than all other biofillers.

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POLYONE CO.

The Company
- More than 60 manufacturing and distribution facilities in 20 countries
- Operations in North America, South America, Europe and Asia
- Joint ventures in North America
- Corporate headquarters in northeast Ohio (U.S.A.)
- More than 35,000 products

Turnover
- 2.1 billion $ (2009)

Employees
- More than 10,000 employees globally

Branches
- Global leader offering a comprehensive array of specialized polymer materials
- Tailored services
- End-to-end solutions

Key bio-based products
- OnCap™ BIO Impact T additives - additive concentrates for biodegradable polymers

OnCap™ BIO Impact T
Transparent impact modifier for polylactic acid

Challenge Polylactic acid (PLA), although a relatively new polymer, has been specified for a broad and growing range of applications. It is embraced because it is based on renewable resources and appreciated for its extreme transparency and rigidity. However, for many applications, it is desirable to have improved impact properties.

Solution Typically, impact modifiers are used to enhance impact resistance. While a range of impact resistant polymers are available for polylactic acid systems, the options are limited by the demand for retention of transparency. PolyOne has discovered a combination of additives and molecules used at the nano-scale that results in the desired increase in impact resistance while maintaining good transparency.

Value Provided The use of OnCap™ BIO Impact T increases STET impact resistance of PLA while maintaining its transparency.

- The increased toughness improves tear resistance. This makes the sheet easier to cut during fabrication and simplifies handling and safety by reducing rough edges and uneven cuts. This also makes the sheet fit for final end use, helping improve consumer acceptance.
- Improved ductility also allows for holes to be punched in trays without tearing or shattering the tray itself. This results in increased production with less product failure as well as increased food safety.
- Reduced brittleness decreases the shattering of cups and trays during handling and packing, which lowers scrap rates and increases safety.
- Attractive, clear parts stand out on the shelf, helping improve consumer acceptance thereby increasing sales revenues and profits.

Implementation OnCap BIO Impact T is available as a compound, or in a solid or liquid concentrate, for use in PLA resin. Usage rates vary based on the effect desired. OnCap BIO Impact T can be used with other processing additives and can be combined with colorants into a single Smartbatch™ BIO concentrate.

Applications OnCap BIO Impact T can be used in a variety of plastics processing equipment, including extrusion, injection molding, blow molding and film processing. Typical applications include food and beverage packaging, shopping and refuse bags, and consumer goods such as toys.

Link to Agrobiobase

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POLYVLIES FRANZ BEYER GMBH & CO. KG

Foundation
- 1850

Turnover
- About 50 million €

Employees
- Over 250 employees

Branches
- Agriculture & Horticulture
- Automotive
- Building and Construction
- Consumer Goods
- Packaging

Key materials
- Flax
- Hemp
- Kenaf
- Sisal
- Jute
- Wool
- Cotton

Key bio-based products
- Naroplast®
- Narodur®

"Nonwovens for innovations. Innovations for nonwovens."

Polyvlies is an owner-managed medium-sized family company with over 250 employees.

Polyvlies produces and finishes technical nonwovens made out of synthetic and/or natural fibres. Because of incorporating the most modern technology Polyvlies is capable of producing technical textiles with a maximum working width of 6 metres and weights from 80 to 4,000 g/m².

The focus on customer orientation and joint application-specific developments has resulted in a range of more than 6,000 products that are produced from a number of different raw materials in an order-specific production procedure for various sectors (e.g. automotive, home textiles and geotextiles etc.)

Materials

In addition to the use of a wide variety of synthetic fibres, per example polypropylene and polyester, a further focus is the processing of renewable raw materials. Based on our years of experience in this sector, the respective production processes are continuously modified and the production capacities consistently expanded. Of the 15,000 t of fibres that are turned into nonwovens every year at Polyvlies, 5,000 t are already natural fibres. These include flax, hemp and kenaf, but sisal, jute, wool and cotton are also still used.

The customer groups and applications for these natural fibre products are wide-ranging (e.g. construction, furniture, agricultural, automotive industries etc.) The preliminary products or semi-finished products for natural fibre reinforced plastic composites make up the lion's share here. Primarily, they are used for thermoplastic and thermosetting compression moulding in the automotive industry.

Products

Naroplast®

Naroplast is a thermoplastic natural fibre plastic composite whose benefits, such as high strength and impact resistance combined with a low weight, come to the fore after compression moulding. This means that it is especially suited to ideally satisfy the strict requirements of the vehicle manufacturing industry. Compared to conventional materials, the symbiotic combination of renewable raw materials and synthetic polymers plays an important role in conserving natural resources, storing CO_2, saving fuel, increasing passive safety and reducing noise levels. In addition, the matrix polymers can now also be replaced with low-emission materials without compromising performance.

Narodur®

Narodur is a thermosetting natural fibre plastic composite whose benefits, such as high strength and especially high stiffness combined with a relatively low weight, come to the fore after compression moulding. This means it is especially suited to ideally satisfy the very strict requirements made of carrier parts in the automotive, construction, shipbuilding or furniture industries. Here again, the symbiotic combination of renewable raw materials and synthetic polymers help to counter global warming, reduce noise emissions and contribute to passive safety. Depending on the application, customers have a choice of various matrix systems that can be supplied as pre-impregnated and ready for use in the pressing moulds.

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PROGANIC GMBH & CO. KG

Foundation
- 2010

Branches
- PHA, PLA, plant wax and minerals based biopolymers for household cleaning equipment, gardening products, food packaging, containers, toys, water filtration systems and component parts...

Trademark
- PROGANIC® is a registered trademark of Proganic GmbH & Co. KG

General description
- PROGANIC® is a biopolymer – which is fully biodegradable

Key components
- PHA, PLA, plant wax and minerals

Key bio-based products
- Biodegradable plastic products for the daily use

Each item carries the PROGANIC® quality seal of approval.

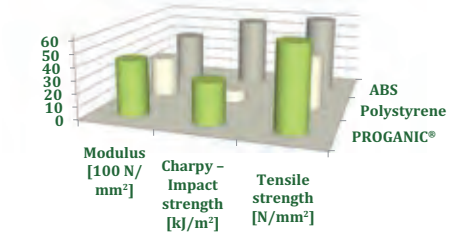
Material

PROGANIC® is made from 100% renewable raw materials and minerals. It is just as durable as plastic but is organic and can be reintroduced into the earth's natural cycle by composting. Choose PROGANIC® wherever you see the PROGANIC® seal of approval for a responsible attitude towards your earth and the environment.

Composition

- PHA (Polyhydroxyalkanoates) – We use the biopolymer PHA, which is made by bacteria. PHA has the same qualities of plastic, but it uses renewable raw materials such as sugar from crops, instead of finite natural resources such as crude oil, natural gas and charcoal.
- PLA (Polylactic acid) – PLA is also produced from renewable raw materials such as sugar from crops.
- PLANT WAX – We use the hardest known natural wax derived from the Carnauba palm leaves. It is harmless to health and fragrance free.
- MINERAL – We use a natural mineral as filler (bulking agent), which has water repellent and sealing properties.
- COLORS – We supply an-organic color pigments to all PROGANIC® customers.

PROGANIC® in comparison to commonly used plastics

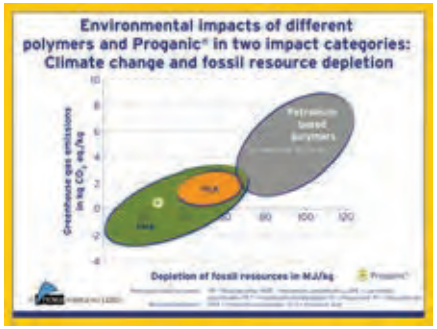


PROGANIC® has the same hardwearing and versatile characteristics as conventional plastics. It is an ideal substitute for commonly used plastics. PROGANIC® can be used for all types of consumer articles predestined to come in contact with food and beverages. It is suitable for all types of articles for daily use such as flowerpots, watering cans, containers, trays, as well as for all disposables and food packaging.

Award In 2010 PROGANIC® was awarded the bio material of the year 2010 by the renowned nova-Institute.

Customers Since 2010 brands such as PROPPER, RIVAL and DORAPLAST produce household and gardening products made from PROGANIC®. The range varies from watering cans, flowerpots, adhesive hooks to brushes and kitchen tools. PROGANIC® products are available in stores in Germany as well as major retailers internationally. PROGANIC® is a strong brand with a clear marketing strategy. Therefore, we support our manufacturers with complete advertising packages and communication measures for their point of sale.

PROGANIC® – PRO EARTH



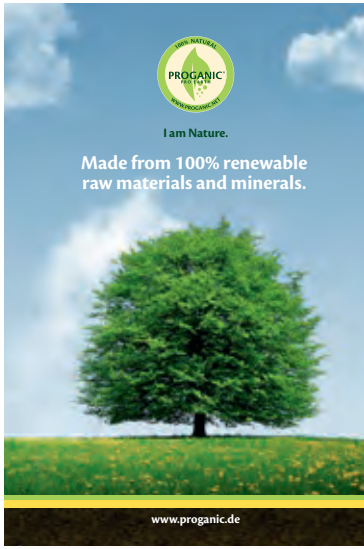
The figure above shows the results of a meta-analysis of life cycle assessments for bio-based polymers in the production of Proganic®. The ellipse on the upper right, which contains data with a use of fossil resources of more than 70 megajoules per kilogram plastics and greenhouse gas emissions of partly clearly more than three kilograms CO_2 equivalents per kilogram plastics, correlates to petrochemical plastics. The other two ellipses illustrate the results of the bio-based plastics PLA and PHA/PHB, the data of which for the use of fossil resources are lower than 70 megajoules per kilogram plastics. At the same time the greenhouse gas emissions of bio-based plastics amount to clearly less than three kilogram CO_2 equivalents per kilogram plastics. Calculating the greenhouse potential of Proganic® yielded an amount of 0.5 kilograms CO_2 equivalents per kilogram of that bio-based material. The use of fossil resources was calculated at 27 megajoule per kilogram Proganic®. That means: If the production of PLA and PHA/PHB, in comparison to the production of petrochemical plastics, leads to lower greenhouse gas emissions and lower use of fossil resources, this is to be expected for Proganic® itself. In the figure above, one can see the respective values marked with the company logo of Proganic®.

Advantages

- Made from 100% renewable raw materials and minerals
- Saving CO_2 emissions and conserving the earth's natural resources
- Fully biodegradable formula
- Food safe
- Water resistant and repellent
- Weather resistant to the suns UV rays
- Extremely hard wearing and resilient

PROGANIC® and the Future

Our vision is to replace conventional plastic with PROGANIC® as much as possible. We invite other plastic manufacturers to join us and become a PROGANIC® manufacturer. PROGANIC® is 100% natural; our quality seal confirms this on every product. PROGANIC® is our contribution to a sustainable way of life and the preservation of the earth's natural balance.



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PURAC

Foundation
- 1930

Turnover
- 400 million € (2010)

Employees
- 1,100

Branches
- Leading company in Lactic Acid based bioplastics and the worldwide market leader in Lactic Acid, Lactic Acid derivatives and Lactides

Key materials
- Beet sugar
- Cane sugar
- Tapioca starch
- Corn starch

Key bio-based products
- PURALACT L® and PURALACTD® - L-Lactide and D-Lactide monomers for the bioplastics industry
- L-Lactic Acid
- D-Lactic Acid

Company

Purac is a leading company in Lactic Acid based bioplastics and the worldwide market leader in Lactic Acid, Lactic Acid derivatives and Lactides. Purac has 80 years of experience in the development, manufacturing and marketing of these products. Purac operates production plants in the USA, the Netherlands, Spain, Brazil and Thailand and markets its products worldwide.

Products

L-Lactide and D-Lactide monomers for PLA: PURALACT L® and PURALACT D® are Purac's monomers for the bioplastics industry. Lactides, are dimers of Lactic Acid and so called building blocks for polymers and the production of other chemicals. There are two types of Lactides available: D-Lactide and L-Lactide. Purac's Lactides are characterized by its high stereo optical purity which is a great technological and economic advantage during further processing into lactic acid based bioplastics.

The earliest and best know use of lactic acid as a building block is the use as a monomer for the production of PLA. However, Purac has also performed extensive research on other uses of Lactic Acid and its derivatives, such as in thermoset resins.

Heat-resistant PLA: Combinations of L-Lactide and D-Lactide can be used as a solution to create PLA co-polymers or homo-polymers with a range of features. The availability of pure D-Lactide also offers the possibility for further development of second generation PLA which is based on stereo-complex technology. This technology offers the unique possibility to increase the heat-stability of PLA from 70 up to 230 degrees Celsius. D-Lactide can be used to develop a range of heat-resistant PLA products for plastics, films, fibers and foam applications. L-Lactide and D-Lactide, together with an associated polymerization technology, enable our partners to produce a wide range of PLA products in an economic way.

Industrial production of Lactide monomers for PLA: At the end of 2011 Purac finalized the construction of the new Lactide plant in Thailand. The investment was driven by Purac's commitment to play a leading role in the market for Poly Lactic Acid. The capacity of this new plant is 75,000 tons of lactide per year. The plant is designed to produce both L-Lactides and D-Lactides, made out of L- or D-Lactic Acid sourced from existing Purac plants.

Innovating in sustainability: To keep on innovating is our passion. New products, new processes, new applications, new markets, improved product quality and production efficiency have always been important reasons for our continuous innovation efforts. Now, sustainability and a reduced carbon footprint have joined this list and become increasingly important drivers for Purac's innovation programs. Key topics in the sustainability program are: alternative feedstock materials, minimizing the use of auxiliary chemicals, reduction of the energy use, increased use of green energy and replenishment of nutrients into agricultural soil.

Link to Agrobiobase

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RE8 BIOPLASTICS AB

Foundation
- 2009

Key materials
- Biocomposites/WPC for injection moulding and extrusion

Key bio-based products
- WoodFiber Inject – Wood Plastic Composites specially designed for injection moulding
- Biocomposites from fibres like cotton, pulp-fibers…

Company

re8 Bioplastics is a company developing, producing and selling materials with renewable resources as a base.

We want to use renewable materials to make the plastic industry rethink the dependency on oil and together create something better.

Apart from producing materials we can help injection moulders with the whole transition from an oil based material, i.e. product design with aspects of the material, tool design, material composition etc.

Materials

We focus at this stage on biocomposites and since we are situated in Sweden we have a great source of wood. This results in that we get good quality fibers and with our controlled process we produce one of the best Wood Plasic Composite (WPC) materials in Europe.

We have also developed a new method to produce biocomposites from fibers like cotton, pulp-fibers etc. Contact us if you want to know more about that.

Scandinavian WoodFiber

WoodFiber is a WPC-material that is suitable for injection moulding and extrusion. The matrix material can be varied, but our standard materials are with PP and PE as well as PLA.

Our customers are usually impressed by the high quality, the brightness and colorability, the little smell as well as the resistance to moisture, compared to other WPC-suppliers.

Products

WoodFiber can be used in many applications and therefore the customers are quite diverse as well. To give some examples, IKEA have produced a couple of furniture in WoodFiber and Volvo Cars are planning to use it in their door panels. By changing from a glass fiber reinforced plastic to WoodFiber, Volvo Cars could reduce weight, increase the amount of renewable materials, increase the possibility to recycle, reduce material costs and reduce production costs. The decrease in production cost derives from less wear on machines, shorter cycle times and less energy use.

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RESOPAL GMBH

Foundation
- 16.11.1867 by August-Hermann Römmler in Spremberg, Lower Lusatia, Germany

Turnover
- Approx. 150 million € in 2011

Employees
- Approx. 640

Branches
- High pressure laminate industry

Key bio-based products
- High pressure laminate, worktops, Resopal boards, RE-Y-STONE® - a 100% ecological room design material

In 1998, the economically affected Resopal GmbH became a subsidiary of the globally oper-ating American laminate producer Wilsonart International, Temple/Texas, which is part of the ITW Group (Illinois Tool Works Inc.). In the previously hierarchically managed company, a new culture, Project M developed.

„We take responsibility for our employees, their families and the future of their children."

That is the central principle of „Project M". This places people right at the center of all activities while also defining a responsibility to the environment.

The brand new RE-Y-STONE® complements the existing interior design possibilities by a sustainable, 100% ecological, emission and petrol free material, which uniquely combines functionality with maximum aesthetic appeal and emotional design. RE-Y-STONE® is made of recycled core and decorative paper and a natural resin obtained from the waste of sugar production. Its highly resistant surface is durable, mechanically very strong and dimensionally stable. Completely homogeneous, in deep black or a warm brown, the surface of RE-Y-STONE® resembles the many faces of nature, yet also has a very modern feel. Colour is provided by recycled decorative paper or ecological materials, while the structure is based on organically grown fibres, giving a pure natural appearance and authentic relief with a depth of structure previously unseen.

RE-Y-STONE®
- Is 100% ecological
- Is nonpolluting
- Is non-petroleum based
- Is made of recycled core and decor paper and natural resin, extracted from sugar production waste
- Displays structures in previously unattainable depths
- Is a hard, durable, extremely tough, dimensionally stable sheet with a resistant surface
- Combines functionality with maximum aesthetics and emotional design

Resopal also has a sustainable solution for the floor: RE-Y-STONE® eco signature floor.

For this RE-Y-STONE® is bonded on a HDF substrate from sustainable forest management (FSC certified).

Im Jahr 1998 wurde die wirtschaftlich angeschlagene Resopal GmbH ein Tochterunternehmen des weltweit operierenden amerikanischen Schichtstoffherstellers Wilsonart International, Temple/Texas, der Teil des ITW-Konzerns (Illinois Tool Works Inc.) ist. In dem zuvor hierarchisch geführten Unternehmen entstand eine neue Kultur, das Projekt M.

„Wir übernehmen Verantwortung für unsere Mitarbeiter, deren Familien und die Zukunft derer Kinder." Das ist der zentrale Leitsatz von „Projekt M". Sie stellt den Menschen in den Mittelpunkt aller Aktivitäten und definiert die Verantwortung gegenüber der Umwelt.

Die Weltneuheit RE-Y-STONE® ergänzt die bisherigen Raumgestaltungsmöglichkeiten um ein nachhaltiges, 100% ökologisches, emissions- und petrolfreies Material, das in einzigartiger Weise Funktionalität mit höchstem ästhetischen Anspruch und emotionalem Design vereint. RE-Y-STONE® besteht aus recycelten Kern- und Dekorpapieren und einem natürlichen Harz, gewonnen aus den Abfällen der Zuckerproduktion. Seine widerstandsfähige Oberfläche ist langlebig, mechanisch hoch belastbar und dimensionsstabil.

Durch und durch homogen, in tiefem Schwarz oder warmem Braun, zeigt sich RE-Y-STONE® an seiner Oberfläche in den vielfältigen Gesichtern der Natur und mutet dennoch modern an. Farbe liefern recycelte Dekorpapiere oder ökologische Materialien; Struktur entsteht auf Grundlage organisch gewachsener Fasern, unverfälschter Naturerscheinungen und ursprünglicher Reliefs in bisher nicht darstellbarer Strukturtiefe.

RE-Y-STONE®
- Ist 100% ökologisch
- Ist emissionsfrei
- Ist nicht rohölbasierend
- Besteht aus recycelten Kern- und Dekorpapieren und natürlichem Harz, gewonnen aus den Abfällen der Zuckerproduktion
- Zeigt Strukturen in bisher nicht darstellbarer Tiefe
- Ist eine harte, langlebige, hoch belastbare, dimensionsstabile Platte mit widerstandsfähiger Oberfläche
- Vereint Funktionalität mit höchster Ästhetik und emotionalem Design

Auch für den Boden hat Resopal eine nachhaltige Lösung: RE-Y-STONE® eco signature floor.

Dafür ist RE-Y-STONE® auf einen HDF-Träger aus nachhaltiger Waldbewirtschaftung aufgebracht (FCS-zertifiziert).

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ROQUETTE

Foundation
- Family-owned French group founded in 1933
- International activity in conversion of renewable raw materials into starch and starch derivatives.
- One of the world leaders in starch industry

Turnover
- 3.0 billion €
- Industrial, sales and agent locations in more than 100 countries.

Employees
- About 6,800 employees worldwide

Branches
- Products for 5 major applications fields: human nutrition, pharmacy-cosmetology, paper-board, chemistry-bioindustry and animal nutrition
- New solutions for the plastic industry (plant-based resins, plant-based plasticizers)

Key materials
- Raw materials: maize, wheat, potatoes, peas and microalgae

Key bio-based products
- GAÏALENE® - plant-based resin
- Polyols (sorbitol, mannitol, maltitol and xylitol)
- Modified starches and proteins

ROQUETTE *Offering the best of nature™*

Company

ROQUETTE, a French family group with an international dimension, processes renewable raw materials: maize, wheat, potatoes, peas and microalgae.

Among the 5 global leaders in the starch manufacturing industry, it offers its customers a wide range of products and solutions in the fields of human nutrition, pharmacy-cosmetology, paper-board, chemistry-bioindustry and animal nutrition. Present in over 100 countries, ROQUETTE has a turnover of 3 billion euros.

The group employs around 6,800 people. Its development, focused on nutrition-health and plant-based chemistry, is based on a strategy giving preference to the long-term, innovation and the commitment to achieve. Its mission: «Serve men and women by offering the best of nature».

Material

Based on 75 years of expertise in starch transformation and the synthesis of its derivatives, ROQUETTE has conceived for converters and compounders, GAÏALENE®, a new range of plant-based resins.

GAÏALENE® plant-based resins are thermoplastic products obtained by a patented hemi-synthesis process by grafting starch, giving them original properties.

Gaialene® *Plant-based Resins by Roquette*

GAÏALENE® resins are:

- Bio-based: over 50% plant-based materials,
- PERFORMANT: displaying specific characteristics such as a soft touch, high shock resistance, natural antistatic properties, high resistance to blush, easy colouring and compounding properties.

- **SUSTAINABLE** and opening new solutions in plastics applications like packaging (bottles, film wrap, etc.), household appliances, automobile industry, interior design and more,
- **PROCESSABLE** on existing lines, but at a lower temperature than traditional plastics (about 170°C) inducing lower energy consumption,
- **COST/EFFECTIVE** plant-based alternatives to common polyolefins, ABS or more technical polymers, for **DURABLE** applications,
- LOW CARBON FOOTPRINT: CO_2 emission reduced by at least 65% compared to polyolefins
- and fully **RECYCLABLE**.

Moreover GAÏALENE® resins also fulfill heavy metals and REACH regulations and can be used for food packaging. They are free of genetically modified organisms.

Typical applications of GAÏALENE® resins grades are:
- blow film extrusion,
- injection moulding,
- extrusion blow moulding,
- and compounding,

R&D in Partnership with Customers

In its main Research and Development Center in Lestrem (France), ROQUETTE employs about 300 researchers and technicians and works alongside its customers in complete confidentiality to develop new expertises and formulate solutions that meet their specific requirements. This represents for them significant savings in terms of time and money, providing with GAÏALENE® resins a competitive edge in their markets where consumers are increasingly demanding and sensitive to sustainable development in their everyday environment.

ROQUETTE

Link to Agrobiobase

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SONAE INDÚSTRIA, SGPS, SA

Foundation
- 1959

Turnover
- 1.3 billion €

Employees
- 5,000 +

Plants
- 27 worldwide

Production
- 7 million tonnes of wood processed annually

Branches
- Wood technology
- Wood product manufacturers

Key materials
- Wood based panels
- Wood Polymer reinforcers

Key bio-based products
- Woodforce

Other products
- Wood-based panels (Particles, PB, OSB)
- High pressure decorative laminates
- Chemical products
- Value added products and services

Link to Agrobiobase

Product

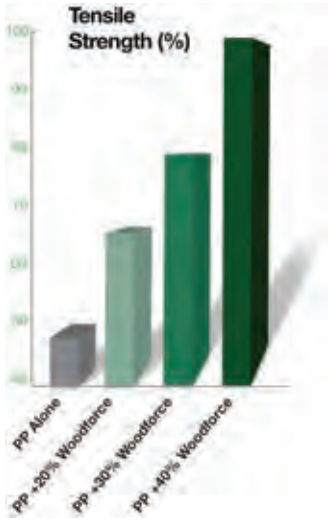
As one of the largest wood product manufacturers in the world, Sonae Indústria can proudly introduce Woodforce. Designed to reinforce polymers, this new and renewable raw material is an easy-dosing product, meeting all of the industrial efficiency objectives of the polymer compounding industry.

This brand new patented technology makes compounders meet sustainable development demand from their customers, whilst maintaining product performance, industrial efficiency, profitability and competitiveness. Supply and quality will never suffer due to an unpredictable climate.

Woodforce is naturally consistent, environmentally sustainable and process friendly. The “ready to use” long wood fibre pellets will produce reinforced thermoplastic parts by injection moulding, extrusion, blow-molding and thermoforming.

The performance

Woodforce fibre provides excellent reinforcement properties comparable to those of standard glass fibre, other natural fibres, and much better than those obtained with particle shaped natural fillers. It’s compatible with most blends of polymers and designed for optimum dispersion within the matrix. Independent research institutes and industrial partners have validated the excellent polymer reinforcement properties of Woodforce.



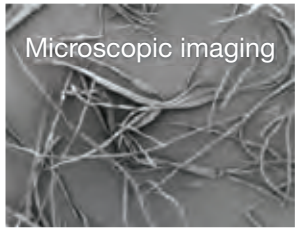
The power of nature

- Woodforce is made of a renewable material and is recyclable.
- Woodforce is good for the environment, helping trees to capture CO_2 from the atmosphere and sequester it.
- Woodforce uses locally sourced wood fibre from certified forests (FSC and PEFC programs).
- Woodforce manufacturing consumes little energy relative to glass fibre manufacturing.

Industrial performance

- Woodforce comes ready to use, with constant properties, and as a homogeneous product.
- Woodforce is easier to dose than any other fibre.
- Woodforce manufacturing capacity is in place as it relies on existing and compatible manufacturing processes.
- Woodforce is not dependent on seasonal production as wood is harvested all year long.
- Woodforce creates no health and safety hazard in your plant (no dust).
- Woodforce is sought after on injection equipment as it guarantees longer life compared to using glass fibre.
- Woodforce colour matches for design opportunities.

Woodforce is a high aspect ratio fibre



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SYNBRA TECHNOLOGY BV

Foundation
- Synbra Technology bv was founded in 1975, part of the Synbra Holding bv

Employees
- 90

Company
- Synbra Holding has 26 production sites in 6 European countries

Key bio-based products
- PLA Synterra®
- E-PLA BioFoam®

Other products
- EPS Styrex®

CERTIFIED CM cradle to cradle

SILVER

BIOBASIERT > 85 % DIN Geprüft

Synbra Technology bv

Synterra®

Company

The Synbra Holding bv has a leading position in Europe regarding expandable polystyrene (EPS) for Sustainable Insulation Systems and Industrial Products & Solutions. Synbra Technology bv, based in Etten-Leur, the Netherlands, is the in-house polymerization, R&D facility 'Technology & Innovation' and centre of excellence in materials and product development of the Synbra Holding bv. A recent example of its innovations is BioFoam®, a biobased and biodegradable alternative for EPS.

Within this framework the first lactide polymerization plant, using recently developed polymerization technology from Purac and Sulzer Chemtech has been built in Etten-Leur. This plant is now producing Synterra® PLA which is used for BioFoam®. BioFoam® will be positioned complementary to the wide range of EPS products offered today. The new plant has a capacity of 5,000 ton/year, which is big enough to explore other application areas as well. Due to access to unique monomers the properties of Synterra® PLA go beyond the current state of the art. With this move the Synbra Holding bv intends to take a leading position in Europe as supplier of sustainable and biologically degradable polymers from renewable resources

Material

Synterra® PLA

Synterra® PLA is a 2nd generation PLA made from very pure Lactide Monomers. The Lactic Acid is produced with sugars coming from GMO-free sugar cane crops. Synterra® PLA is available in 2 versions: PLLA & PDLA. PLLA is the standard building block already with good mechanical

Synterra® Synbra Technology bv

& thermal properties. PDLA can be added to improve the properties up to fully Stereo Complex with highest thermal resistance:

- PLLA/PDLA 1010 is a standard grade with good process ability (compounding)
- PLLA/PDLA 1510 is a high molecular weight grade suitable for extrusion

The Synterra® PLA is 100% renewable with low carbon footprint & Cradle to Cradle^{CM} Silver certified.

Injection Moulding compound: Synterra® IM

Synterra® IM is a PLA compound specially developped for injection moulding applications.

The compound is based on pure Synterra® PLLA with addition of Synterra® PDLA & other additives for improved thermal & impact properties.

Synterra® IM has comparable properties to ABS.

BioFoam® E-PLA

BioFoam® is a bio-based PLA Foam (E-PLA) produced in house with Synterra® PLA. It has the highest BioBased rating (between 85 & 100%) Din certified and is GMO-free.

BioFoam® has comparable physical & mechanical properties to EPS.

BioFoam® is applicable as expanded loose bead for filling or insulation properties. It can also be moulded into specific products for construction or packaging (protective or insulation). BioFoam® has a very low CO_2 footprint compared to other materials and is even better than the already very good insulant EPS.

BioFoam® at 35 g/l does not disintegrate after 26 weeks of composting at room temperature (+- 30°C) . BioFoam® is therefore not home compostable as proven by tests carried out by Organic Waste Systems (OWS) Gent, finished March 2010. Test was terminated according to the norm without visible alteration.

BioFoam® disintegrates only during Industrial composting at 70°C under the influence of moisture, bacteria and constant agitation according to EN13432.

Link to Agrobiobase

BioFoam®

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TECNARO GMBH

Foundation
- 1998

Employees
- 28

Branches
- Compounding
- Bio-based and biodegradable materials e.g. for toys, automotive, furniture, electronics, music instruments, packaging, office, building and construction industries as well as in funeral business, agriculture and forestry

Key materials
- Lignin and lignin derivatives
- Polylactic acid, polyhydroxyalkanoates, starch, natural resins and waxes, cellulose and natural fibers

Key bio-based products
- ARBOFORM®, ARBOFILL® and ARBOBLEND® - for moulded parts, semi-finished products, sheets (e.g. for thermoforming), films, profiles, etc.

Company

Founded in 1998, TECNARO GmbH develops, produces and markets bio-based and biodegradable materials. The business is focused on three different material families: Liquid Wood ARBOFORM®, Wood Plastic Composites ARBOFILL® and Biopolymer Compound ARBOBLEND®.

Tecnaro received several awards for innovation, sustainability and in the category supplier: Diesel Medal in gold 2011, European Inventor Award 2010, German Industry Award 2009, Werkbund label 2008, Innovation Award of VR Bank 2007, Golden Euromold Award 2000, etc. and contributed in numerous national and international research projects regarding material development based on natural resources.

Together with Fraunhofer, Tecnaro holds several patents in this field.

ARBOFORM®, ARBOBLEND® and ARBOFILL® can be processed by injection moulding, extrusion, calendering, blow molding, thermoforming or pressing into moulded parts, semi-finished product, sheets, films or profiles.

Today's series applications can be found in toys, automotive, furniture, electronics, music instruments, packaging, office, building and construction industries as well as in funeral business, agriculture and forestry.

Bavarian State Forestry and Jochen Rümmelein: Forest signs made from thermoformable ARBOBLEND®.

Fujitsu, Leader in Green IT and Amper-Plastik: Palm rest of Eco-keypad made from ARBOFORM®.

Sergio Rossi / Gucci Group: Eco Pump made from ARBOFORM®. Picture: Fabian Diehr.

ARBOFORM®

- ARBOFORM® is based on the renewable raw material lignin which is available in huge quantities.
- ARBOFORM® is unique and protected by international patents.
- ARBOFORM® is sustainable, independent from crude oil, reduces environmental impacts and offers new markets for agriculture and forestry business.
- ARBOFORM® combines two big industrial sectors: Wood industry can provide three dimensional parts in an economic way and plastics processors can substitute their materials by an ecological alternative.

Said shortly: ARBOFORM® is "liquid wood"

Extruded decking profile made from ARBOFILL®.

ARBOFILL®

The compounds are made from plastics and natural fibers. This combination offers sustainable and aesthetical materials with good mechanical and thermal properties at very competitive costs.

ARBOBLEND®

- ARBOBLEND® is 100% biodegradable and has similar mechanical properties like e.g. ABS.
- ARBOBLEND® consists – depending on the grade – of biopolymers like the wood constituent lignin or of lignin derivatives and/or other biopolymers like polylactic acid, polyhydroxyalkanoates, starch, natural resins and waxes, cellulose, additives and natural fibers.
- Additional information can be obtained from the TECNARO-Team.

Filaments as well as thermoformable films and sheets made from ARBOBLEND®.

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TEREOS SYRAL

Foundation
- Marckolsheim plant (FR), started in 1993. It became the headquarters in 2007 after the acquisition of other European starch plants. The company now owns 10 plants.

Turnover
- 1.6 billion €

Employees
- 1,700

Branches
- Tereos-Syral is the starch activity of Tereos, a global player in sugar, starch and alcohol.

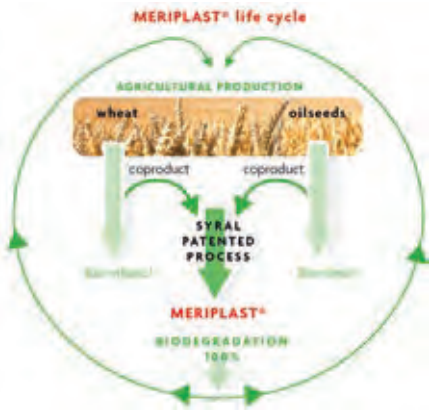
Key materials
- Cereals (wheat and corn) and tubers (potato and cassava)

Key bio-based products
- Meriplast® - a novel flexible and elastic bioplastic
- Starch and derivatives (glucose, maltodextrins, polyols ...)
- Vegetable proteins
- Frain alcohol and bio-ethanol

Company

Tereos Syral is the 3rd European starch producer and transforms in its 10 plants 4 million tons of cereals and tubers into starches and derivatives, vegetable proteins, alcohol and bio-ethanol. These products are used in human and animal nutrition, pharmaceuticals and personal care, paper and corrugated board, chemistry, plastics and bio-fuels.
Tereos Syral is a subsidiary of the French cooperative group Tereos, whose activity is based on sugar beet, sugar cane and cereals processing. Tereos is a leader of bioethanol production in Europe, and intends to pursue its diversification in green chemistry, notably by developing 2nd generation processes.

Our bio-materials today:
- Native and modified starches: for paper, board, plaster boards
- Glucose: for green binders, tensioactives, concrete additives
- Polyols: for polyurethan, adhesives, surfactants, concrete additives
- Ethanol: for biofuels, fine chemistry
- Proteins: for biodegradable plastics



Material

Tereos Syral has developed Meriplast®, a novel flexible and elastic bioplastic. Meriplast® is entirely made from raw materials derived from agriculture and is fully biodegradable. Its specific flexibility and elasticity properties make it unique amongst other currently available biomaterials. Meriplast® can be processed on standard rubber processing machinery. Its targeted applications are moulded objects for interior such as toys, leather imitation for office products (covers), design articles, pieces of furniture. Applications are still in the development phase. Different grades that vary in extensibility and tensile strength can be produced. The material's natural colour is light brown but it can be coloured into a wide variety of tints.
SYRAL received the special award of R&D for Meriplast® at the Biowerkstoff-Kongress in Stuttgart in October 2009.

Why use Meriplast®?

- Sustainability: Meriplast® is 100% based on renewable raw materials and 100% biodegradable. The production process is very mild and fully complies with the principles of green chemistry.
- Mechanical and physical properties: Meriplast® has unique flexibility & elasticity properties. It shows a good resistance to torsion and folding.
- Sensory: Meriplast® displays outstanding sensory properties. It has a very good touch, a good grip without stickiness, it is permeable and absorbs water. It has a pleasant cereal smell.
- Safety: Meriplast® is not toxic when degraded in farmland soil. It does not burn in normal atmospheric conditions: it has a limited oxygen index (LOI) above 21%.

Processing: Meriplast® is thermosetting and has a processing viscosity similar to uncured rubbers. It can be shaped using traditional rubber injection technology, for example on REP machinery (REP International, 69960 Corbas, France). Recommended temperature settings are 60°C in the extrusion section, 70°C in the injection chamber and 140–150°C in the mould. Typical mould shrinkage is 2.5% (determined with a calibrated plate mould).
Meriplast® is available in 15 kg reels with endless strands of 13–14 mm diameter. Different packaging is available on request.

Product stability and degradation: Similarly to other natural materials such as leather or wood, Meriplast® adsorbs water but it is not soluble in water. Prolonged contact with water (e.g. dishwasher) should be avoided. Meriplast® shows full degradation after 36 days in aerobic fermentation (according to ISO 14852 based on the modified Sturm test) and 50 days in farmland soil. Meriplast® and its degradation metabolites are not toxic as tested by microbial inhibition tests.

Mechanical properties: The mechanical properties of Meriplast® are similar to elastic materials such as natural rubber or thermoplastic elastomers up to 100% elongation. Ultimate tensile strength and elongation are however lower. Meriplast® exhibits a complex visco-elastic behaviour with dominant elastic features.

Physical and mechanical properties	Hardness (Shore A-15")	Strength at 100% elongation	Strength at break (MPa)	Elongation at break (%)
MERIPLAST® N60	69	2.3	4.5	350
MERIPLAST® N50	75	2.6	4.8	320

Meriplast® displays a unique, slow elasticity. For example, after stretching the material to an elongation of 100% for 1h, the material retracts to 30% after 30 min and to 4% after 7 days.

Link to Agrobiobase

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UPM

Company
- UPM has production plants in 16 countries and a global sales network

Turnover
- 10 billion € (2011)

Employees
- 24,000

Branches
- Chemical pulp and paper production
- Development of new value-added uses of forest biomass, such as biofuels, biochemicals
- Biocomposites and fibril cellulose

Key materials
- Cellulose blends for injection moulding

Key bio-based products
- UPM ForMi – new cellulose fiber reinforced plastic composite
- Paper
- Biofuels
- Biobased chemicals and additives
- Energy - renewable energy production
- Pulp
- Timber
- Plywood

The Biofore Company UPM

Company
UPM is the Biofore Company whose production is primarily based on renewable raw materials that are biodegradable and recyclable. Over the past years, UPM has invested in the research and development of new value-added uses of forest biomass, such as biofuels, biochemicals, biocomposites and fibril cellulose.

In addition to paper, UPM is also one of the major chemical pulp producers. UPM's chemical pulp product range covers northern softwood and hardwood pulp as well as eucalyptus hardwood pulp. These fibres are strong and they can be reused or recycled several times. Chemical pulp is a natural Biofore product.

In 2011, UPM launched a new biocomposite, UPM ForMi. The composite contains renewable cellulose fibres which reduce usage of oil based plastics. UPM's composite products are examples of our innovative thinking and total lifecycle approach.

Material
UPM ForMi is specially designed for injection moulding applications. Principal ingredients are specially selected cellulose fibres and virgin polypropylene. Cellulose fibres substantially increase stiffness and strength of polypropylene. It brings new possibilities to injection moulding by combining high-quality to sustainability.

UPM ForMi granulates offer smooth and reliable processability. Due to high quality of pulp raw material, UPM ForMi granulates enable clean and odourless composite products. A specially selected mixture of virgin plastic completes the mouldability of granulates for a wide range of end products with precise details. In addition, UPM ForMi offers unlimited dyeing possibilities.

The Biofore Company UPM

The share of renewable material can reach up to 60% thus the product is recyclable or it can be burned for energy at the end of its lifecycle. Moreover, UPM ForMi's carbon footprint is significantly lower than traditional plastics'. The manufacturing process is cleaner because UPM uses bio-based energy in the production. Renewable fibre raw material is sourced via UPM's supply chain from sustainably managed forests.

Products
UPM offers the granulates for injection moulding in the following grades – UPM ForMi GP for general use, UPM ForMi SP for special surface, UPM ForMiTP for technical applications, and UPM ForMi EFP for thin-walled applications. New grades are under constant development.

UPM ForMi is suitable for manufacturing both consumer goods and industrial injection-moulding products. The new composite has extensive opportunities as the product range can vary from electronic and automotive industries to furniture, tableware and other goods for everyday living.

Suppliers

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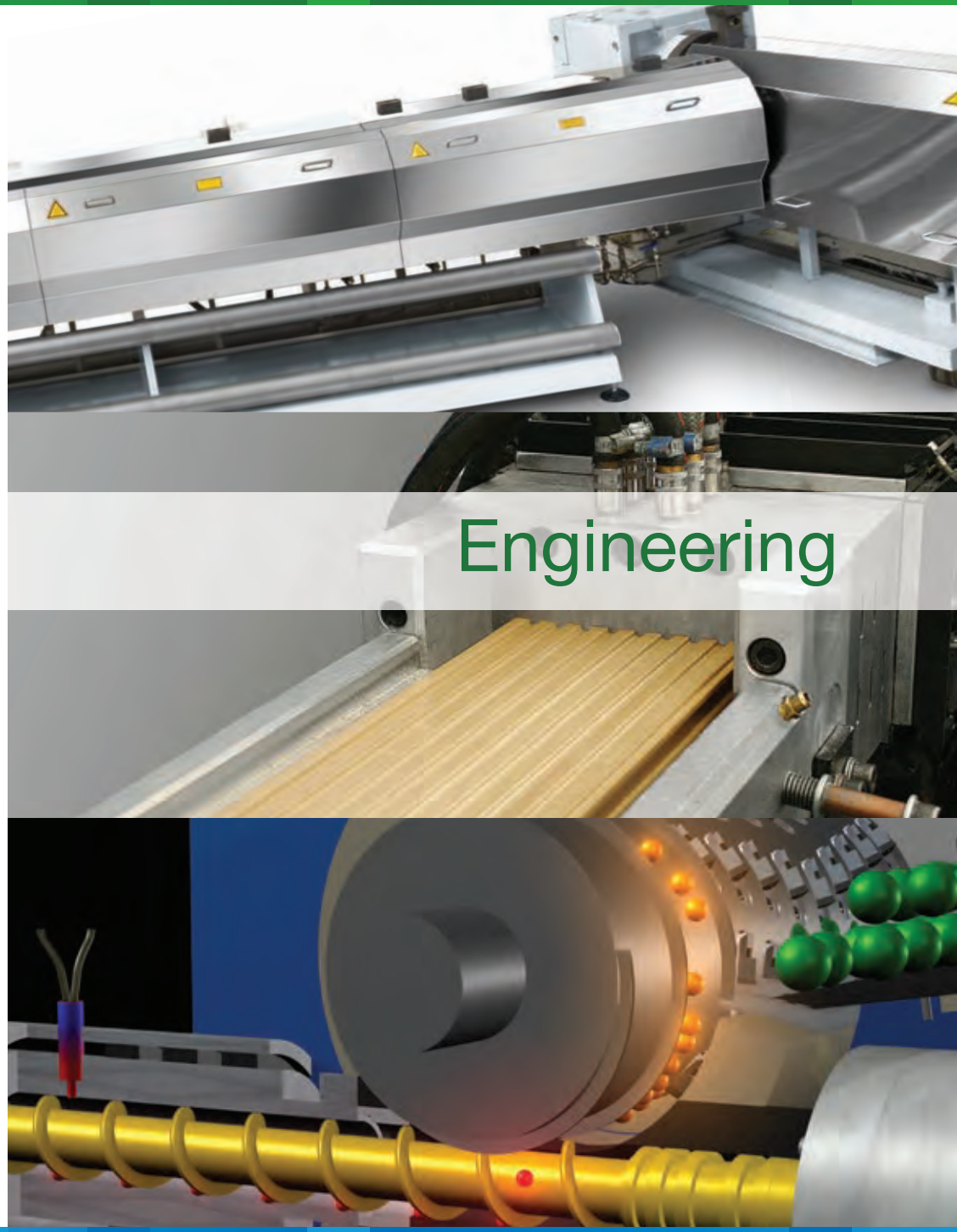
Engineering



Engineering

COPERION GMBH

Compounding systems installed worldwide
- 10,000

Bulk materials handling systems installed worldwide
- 8,000

Employees worldwide
- 1,700

Network of locations worldwide
- 29

Key products/services
- Twin screw extruders
- Processing of bio-based and biodegradable products
- Processing of WPC wood plastic composites

Compounding plant for the production of WPC wood plastic composites

coperion
confidence through partnership

Integrated system solutions – unique process engineering know-how – global presence: In Coperion, formerly Werner & Pfleiderer, you have a partner on hand to provide the optimum solution to every compounding task. This ranges from special applications on laboratory scale to industrial-scale production extruders. As pioneers in the development of the closely intermeshing, co-rotating twin screw extruder, we have unique expertise and experience in this field. Since the 1950s, Coperion has continued to set new standards in processing machinery and plant design for compounding technology. We plan and implement compounding systems for the plastics, chemicals and food industries which are designed precisely to our customers' applications. Over 10,000 compounding systems delivered all over the world are proof of our unique system and process competence.

Twin screw extruder ZSK Mc^{18} with specific torque of 18 Nm/cm^3

Processing of biobased and biodegradable products: Processing of biobased and biodegradable products makes very high demands on the compounding process because of the variety of possible base polymers and the great differences in the formulation mixtures. Every process step in a processing plant must be adapted exactly to the desired mechanical properties of the end product.

We have built up a comprehensive know-how for the processing of biobased and biodegradable products. Our specialists benefit from our years of experience in the fields of cooking extrusion and plastic compounding which we gathered under our former name Werner & Pfleiderer.

1 Starch / powder premix I 2 Plasticizer / liquid additives I 3 Polymer pellets I 4 Twin screw side-feeder ZS-B I 5 Atmospheric degassing I 6 Vacuum degassing I 7 Die head I 8 Water bath I 9 Airknife I 10 Strand pelletizer

Typical plant structure for the production of biobased and biodegradable products

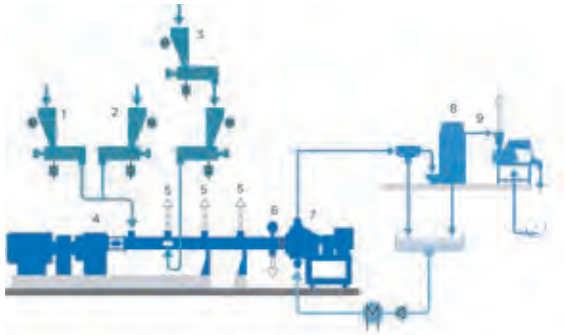
coperion
confidence through partnership

Our twin screw extruders are the heart of the processing plants. The modular structure of the process section enables individual configuration to every application so that optimal product qualities are achieved. Apart from the extruder, we also provide the entire plant periphery from the raw material feeding to pelletizing and drying of the pellets. Alternatively, it is possible to produce biobased and biodegradable products by direct extrusion.

Typical applications for the processing of biodegradable products
- Starch-based loose fill
- Thermoplastic starch
- Polylactide (PLA), PVOH, synthetic copolyester, PBS, PHA, PCL, CA
- Compounds of immiscible polymers / biomaterials
- Pelletizing of PLA, polymerization of PLA

Processing of WPC wood plastic composites: Our twin screw extruders have proven themselves successfully on the market for the production of WPC wood plastic composites for many years. As a long-standing partner to the wood fiber industry, Coperion is well-known for its extensive process and system know-how with every process step of the compounding plants adapted individually to the application: from filling and reinforcement to devolatilization. Coperion implements solutions for the production of WPC wood plastic composites which are custom designed for your individual application – from the laboratory twin screw extruder to the industrial production plant in modular design.

Typical applications for the processing of wood plastic composites
- Filling and reinforcement with 40-70 % wood
- Filling and reinforcement with natural fibers such as flax, hemp, cellulose
- Compounding for injection molding applications
- Profile extrusion with WPC profiles



1 Polymer feeder I 2 Additive feeder I 3 Wood fiber feeder I 4 Twin screw extruder ZSK I 5 Degassing I 6 Start-up valve I 7 Pelletizing unit I 8 Dewatering I 9 Pellet drying

Typical plant structure for the production of WPC

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GREINER EXTRUSION GMBH

Foundation
- 1977 as Uniplast

Employees
- 300

Key materials
- PVC
- WPC

Key products/services
- Extrusion tooling
- Extrusion machinery
- Field service, support and training
- Plant engineering

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Company

Within the last 25 years Greiner Extrusion has become the world market leader for tooling and downstream equipment for the plastic profile extrusion. The range of competences varies from individual tooling to complex plant engineering for the window profile production. The great development of all subsidiaries, which is based on a progressive innovation and personnel policy, helped solidify Greiner Extrusion in the position of a world market leader. The technical leading position, amongst others at tooling for the extrusion of wood fibres, did lead to the broadening of the company's product portfolio. Therefore, WPC-tooling (Wood Plastic Composites) represent an important part of the broad spectrum of products and services. With nearly 300 employees at five locations Greiner Extrusion offers you contact partners in close reach of your business.
Greiner Extrusion belongs to Greiner Tool.Tec and is thus a part of the Greiner Group – the largest family-owned company in Austria.

Products & Services

Extrusion Tooling
- Power Tooling – high performance tooling for a top production leas
- Post-Co-Extrusion – online extrusion of profile gaskets
- Co-Extrusion – grinding stock processing technologies
- WPC tooling
- Foam tooling

Extrusion Machinery
- get.IN-LINE – modular system for individual solutions
- SmartLine – standard downstream unit for single strand extrusion
- Wide Extrusion Line – your solution for the extrusion of wide profiles
- Co-Extruder – production of gaskets
- Additional Equipment

Service
- Field Service – efficient on-the-spot-service
- Spare Parts Service
- Support
- Training

Plant Engineering – complete solutions for plastic window production

Production Capacity

Greiner Extrusion together with its subsidiaries is able to realise 700 tooling per year.

Company

The **Gruber Group** is a reliable supplier of tooling who is known for its especially innovative solutions and high quality within the world market. The standard version of the individual single tooling and a diversified machining program are established as quick-change-system. Hence, the customers benefit from time saving and quality advantages in the profile extrusion, which is marked by continuously increasing output.
The high-end tooling producer Gruber Extrusion GmbH is one of the global leading providers for plastics profile extrusion projects with 220 employees worldwide. True to its guiding principles the company with headquarters in Pettenbach/Upper Austria achieves a winning margin through innovation with tooling and machinery for profiles in PVC, plastics and compounds. The customer proximity policy the company pursues is demonstrated by its pilot plants in Austria, Russia and the USA plus a branch in China. Our subsidiary company Automated/USA is specialised in tooling for WPC and BPC since many years and has realised a big number of tooling for this range of application.
Gruber Extrusion belongs to Greiner Tool.Tec and is thus a part of the Greiner Group – the largest family-owned company in Austria.

Products

Extrusion Tooling
- Gruber Effex Die – higher efficiency and flexibility for the production
- Gruber CoFlex Die – Coextrusion with quick-change-system
- Woodex – Toolings for WPC and BPC profiles
- Dry/Vacuum Water Tank System
- Dry Water Bath-System
- PCE-System

Extrusion Machinery
- Effex-Line – eco-friendly and efficient
- Win-Line – economic and long-lasting
- CT-Series – flexible and individual
- VESK – Energy Saving Systems
- Co-Extruder – precise and easy handling

Window Systems
- Tilt-Turn systems, Sliding systems, Casement systems, Roller shutter systems

Turn-Key-Projects – all from one hand
- Feasibility studies and Consulting
- Engineering
- Manufacturing
- Installation and Commissioning

Production Capacity

Gruber Extrusion with its subsidiaries is able to realise up to 300 tooling per year.

GRUBER EXTRUSION GMBH

Foundation
- 1993

Employees
- 181

Key materials
- PVC
- WPC

Key products/services
- Extrusion tooling
- Extrusion machinery
- Turn-key-projects
- Window systems

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CEO

Engineering

HANS WEBER MASCHINENFABRIK GMBH

Foundation
- 1922

Employees
- Approx. 350

Branches
- Machine building for the plastic processing industry

Key materials
- All kinds of thermoplastic materials
- Wood polymer composites (WPC)

Key products
- Extrusion lines

Company

The family business WEBER was already established in 1922 and today it is led by the third generation. At the beginning gearboxes, especially continuously variable ones, as well as grinding/sanding machines were manufactured and sold with success. For more than five centuries extrusion lines have been developed and produced at WEBER that are successfully used for production of pipes and profiles. Numerous patents for equipments relevant in processing and especially for gearboxes are now standard in extrusion. WEBER takes the statement “Made in Germany“ a step further and manufactures its extruders and their components (except electronics) in the Upper Franconian city of Kronach. Therefore an extremely high availability of spare parts, especially for older machines, is guaranteed.

Since the WPC-Extrusion has been taken on again in Europe in the middle of the 1990s, WEBER is significantly involved in the development of line concepts to extrude profiles of WPC. It was possible to come back to experiences of former decades. As WEBER Extruders were already used for production of wood fiber filled PVC profiles after the “oil crisis“ of the 1970s.

Due to the nearly free formability of the material WPC during the extrusion process there are many application possibilities for the different products. WPC is mainly used for terrace boards and other profiles similar to wood. These new materials are also excellently suitable for inside decoration profiles and furniture as here the advantages specific for this material can be used optimally.

Today the applied extrusion processes to produce profiles of WPC are divided as follows:

Direct Extrusion, or the single-stage process, in which the several recipe components as shavings, plastics etc. are added separately on the extruder and out of that final products are produced directly

Processing of compound, the two-stage process. In a first step a compound is made of the several components that then is processed to a final profile in a further extrusion process. Due to the higher productivity as well as the better reproducibility this process is getting more and more accepted in practice.

So a wide range of special twin screw extruders has been developed during the last years that are permanently adapted to the latest state of the art. The results of this are for example a special wear protection of the processing unit with layer thicknesses of several millimeters as well as an optimized venting unit. Parallel as well as conical twin screw extruders with an output of up to 1,000 kg/h are used. The recent developments of WEBER in the area of WPC-Extrusion are:

The Co-Rotating Twin Screw Extruder which is able to generate the necessary mass pressures for the profile extrusion without melt pump. By this the infavourable wear behavior of the usually used counter-rotating twin screw extruders as well as their deficit in dispersion capacity can be improved. This alternative is available in three different sizes and covers the capacity range up to 400 kg/h.

The complete profile downstream line was optimized for the requirements of WPC-Extrusion. WEBER designed a special cutter with which besides cutting also the desired surface behaviour ‘brushing‘ inline is possible in one working step. The respective calibration table was optimally adapted to the tooling also obtainable at WEBER. By this reasonably priced and compact downstream lines that can be combined with different WEBER Extruders without any interface problems are available for the customer.

With this WEBER created the necessary qualifications for the respectively optimum system solution. A team of experienced processing engineers accompany and advice the customer already starting with the idea of the product. In a large and modern laboratory the individual components are available in order to work out the optimum solution during trials made together.

WEBER can offer the complete system solution from one source for the different ideas in the area of producing profiles which is perfectly made for the requirements of the customer. Everything from one source, everything in proverbial WEBER quality, everything „Made in Germany“ and everything with the legendary WEBER service.

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HARBURG-FREUDENBERGER MASCHINENBAU GMBH

Foundation
- 1942

Employees
- Approx. 240

Branches
- Mixing room equipment for rubber and plastic applications

Key products/services
- Internal mixers
- Dump extruders
- Automation systems
- Complete mixing lines
- Customised engineering

MIXING GROUP

Company

Applying our competence in mixing room technology to your Wood Plastic Composites and Natural Fibre reinforced Plastic compounds: Harburg-Freudenberger Maschinenbau, a company within the HF MIXING GROUP, is traditionally focused on the rubber business and so heavy duty internal mixers became one of the Key products.

Following the increasing interest for Wood Plastic Composites (WPC) and Natural Fibre reinforced Plastics (NF-P) as well as requests for new compounding technologies tailored to the special demands of these materials, Harburg-Freudenberger has recently developed very successfully mixing room solutions based on internal batch mixer technology with intermeshing rotor design.

Today our latest generation of machinery sets a new standard for the compounding of Wood Plastic Composites and natural fibre reinforced plastics. This development, combined with our specialized automation control system **ADVISE ES** and its functional modules **ADVISE ES Batch Temperature Limit Control** and **ADVISE ES Ram Position Profile**, has raised the bar in compounding.

All statements are based on intensive research and development work in our world-wide established R&D centre which is also available to our customers for proving their own compounds. Equipped with state-of-the-art mixing room technology we offer the opportunity to carry out mixing trials from laboratory to production scale. This provides our customers the possibility to confirm the capability of our machines under real production conditions before making an investment decision.

Besides Harburg-Freudenberger's internal batch mixer technology, Farrel Corporation, another company within the HF MIXING GROUP, again with a vast experience in mechanical engineering related to the Rubber and Plastics Industry has within its' product portfolio the Farrel Continuous Mixer (FCM) and Long Continuous Mixer (LCM) which have demonstrated their ability to successfully incorporate high levels of mineral fillers into various biodegradable polymers giving excellent dispersion whilst operating at low specific energy levels – offering potential for cost savings. Farrel also give the opportunity for customers to run their formulations on midsized production machine to verify product quality and scale up parameter to other equipment within the range. For further information regarding products of the Farrel Corporation please visit the homepage of the HF MIXING GROUP.

MIXING GROUP

Products

Innovative compounding technology for Wood Plastic Composites (WPC) and Natural Fibre reinforced Plastics (NF-P): Harburg-Freudenberger provides innovative and individually designed mixing room solutions based on internal mixer technology. The internal mixer technology is capable of incorporating high contents of fillers into various polymers. Typical fillers include, however, may not be limited to: wood flour, technical wood fibres, natural fibres such as kenaf, jute, hemp, cellulose etc. Depending on the plant configuration and the raw materials to be processed, throughputs of more than 3,000 kg/h per mixing line are possible.

Apart from the mixing line key components such as internal mixer and dump extruder, we also can provide the entire plant periphery from raw material feeding to ready packed granulate including PLC control system ADVISE CS and our automation system ADVISE ES. Turn-key solutions are possible as well.

Advantages of the internal mixer technology: The internal mixer technology has been well established in the rubber industry for many decades and also offers various advantages for the production of WPC and NF-P:
- High degree of automation guarantees excellent process control, process repeatability and process documentation.
- Fast and optimal adjustment of the process of each material by independently variable process parameters such as mixing time, rotor speed, time and order of addition, ram pressure, fill factor and temperature control.
- Equipment is highly flexible to different forms of natural fibres to be processed - no modification of the equipment configuration is required.
- Direct incorporation of biological raw material components in a one-stage mixing process without any pre-treatment – no pre-cutting or pre-drying process is required. Also raw materials with moisture content of more than 20% can be directly processed.
- Compounds having filler contents of more than 80% and moisture contents less than 1% can be achieved.
- No thermal degradation of the bio-fibre raw materials during compounding by the use of modern controllers and precise process control.
- Surplus or scrap plastic components can be directly introduced into the machine as recycled material – no pre-treatment required.
- Significantly better product properties and superior mechanical characteristics.
- Substantially lower absorbed water content of the final product checked against conventional processes.

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Engineering

ICMA SAN GIORGIO SPA

Foundation
- 1945

Turnover
- 15 million €

Employees
- 60

Key materials
- Biodegradable resins
- Wood plastic and Natural Fibres Composites

Key products
- Co-rotating extruders and complete turn-key systems for compounding and extrusion

Laboratory line for testing formulations

ICMA SAN GIORGIO
Advanced Compounding and Extrusion Systems

Company

ICMA SAN GIORGIO SPA (www.icmasg.it) is a an Italian company belonging to a family-owned group with over 100 years industrial heritage in the mechanical and metallurgical industry. With over 40 years of experience in the production of plastic processing machinery, Icma is today one of the leading suppliers of co-rotating twin-screw extruders and turnkey systems for the compounding industry, sheet extrusion equipment and all kind of special plants where the co-rotating technology can offer a competitive advantage.

Through more than 40 years of R&D, manufacturing and process experience, ICMA possesses a deep knowledge of extrusion/ compounding solutions. Customers depend on ICMA for hiqh-quality, state-of-the art solutions backed by training, technical support and a high level of customer service. ICMA Quality stems from a synthesis of these five points:

- Technology and market EXPERIENCE and KNOWLEDGE
- Constant DEVELOPMENT of applied technology and KNOW HOW
- Strategic CHOICE of materials and components
- Internal MANUFACTURING of the main components
- Systematic CONTROL of the materials and components quality

ICMA manufacturing range is inclusive of the standard twin-screw co-rotating extruders, the high-torque version and high-volume covering all the types of compounded products, ranging from techno-polymers to bio-resins.

Material

Processing of biodegradable plastics

Thanks to its own versatility and constructive modularity, the Icma's twin-screw co-rotating extruder can perfectly process a great number of recipes bound to the so-called bio-compounds (from reactive bio-based materials as starch based resins to bio-resins like PLA or blends)

For many years ICMA is supplying its plants to the main European bio-compounds' producer and this allowed us to develop an in-depth knowledge of this process.

Thanks to its Laboratory equipment ICMA is able to support all those companies – including start-ups and early stage companies – which have decided to invest in this application field.

Products

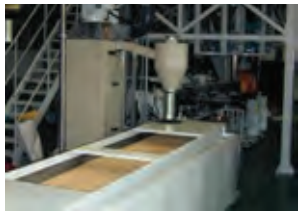
Processing of Wood Plastic and Natural Fibre Composites

Our knowledge in mixing natural fibres and a polyolefin roots back to the early 70's when ICMA successfully pioneered, first in the World, the process technology for producing a thermoformable sheet for automotive interior trims made of virgin or recycled polypropylene and wood flour. This patented technology became a world- wide success in the automotive industry with more than 50 plants worldwide, delivered during the last decades to the major car component manufacturers. This technology came to be known as Wood-stock™. This strong know-how led Icma to successfully develop a full range of WPC applications in Compounding, Sheet extrusion and Profiles as showed in the following paragraph:

- 70's: ICMA patented the process technology for producing a thermoformable WOOD-STOCK™ SHEET for automotive interior trims made of polypropylene and wood-flour.
- 80's: Developed a full range of WPC COMPOUNDING plants in order to respond to the demand from the newly borne WPC profile market in USA .
- 00's: WPC Direct Extrusion Technology has been successfully applied to WPC PROFILE EXTRUSION getting huge benefits in cutting production costs with consistent output performance and quality.

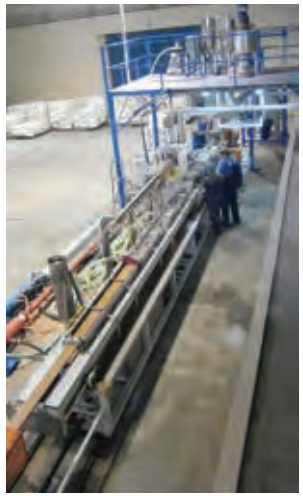
ICMA's co-rotating technology provides superior results compared to alternative technologies like counter-rotating in terms of HIGHER PRODUCTIVITY, BEST QUALITY PRODUCTS due to melt temperature control, side feeding of Wood, superior mixing, superior degassing and UNMATCHED FLEXIBILITY either in process production and maintenance.

ICMA is also a team member of the European Research programme Ultrafibre™ (www.ultrafibre.org) with the objective to improve the compoundability of natural fibres in plastic matrix.



WPC compounding line

Sheet Direct Extrusion



WPC profile Direct Extrusion

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Engineering

NEXT GENERATION RECYCLING-MASCHINEN GMBH

Foundation
- 1996

Turnover
- 23 million €

Employees
- 70

Branches
- Reprocessing of thermoplastic waste of conventional and biodegradable plastics

Key materials
- Starch-based biopolymers
- PLA

Key products
- Recycling machines

Company

NGR – simply one step ahead: NGR stands for Next Generation Recycling Machines. This is the company name, as well as it stands for its innovative technology. NGR builds machines for the reprocessing of thermoplastic waste of conventional plastics as well as Biodegradables.

With NGR's ONE-STEP technology, a patented cutter-feeder-extruder combination, there is no additional pre-cutting systems necessary. Without ever leaving the machine nearly every thermoplastic material can be pelletized back to high quality raw material. As a result reprocessing costs are low and manpower requirement reduced to a minimum. Due to the gentle extrusion process which ensures minimum degradation of the material NGR recycling machines are also very well proven on biodegradable plastics.

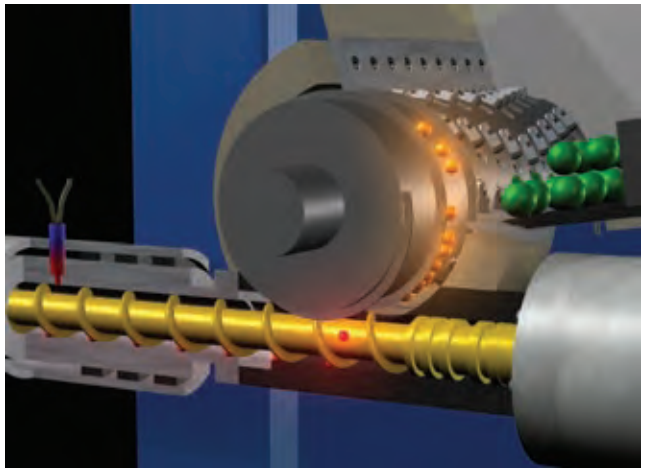
Products

Recycling of bio-based production waste: In most plastics production processes there is waste coming along with the products that converters aim at. Experience shows that in most of the cases 2 to 10% of the production material is lost due to process reasons. The easiest way of recovering this material is to shred it to chips and reefed them to the process together with the new material, but as easy as that is, it can lead to different process difficulties.

In many cases it is favourable to use a recycling extruder, bringing the material back to melt and then to pellets that are of the same quality as the virgin material. The choice of the optimal recycling technology is mainly driven by the objective to bring the material through the process without damaging its chemical and physical properties. Some conventional plastics even have to be handled with care during processing in order to avoid material degradation. The more this is an issue for most biopolymers, some of them being processed at relatively low temperatures of 140°C or being very sensitive to oxidation due to being exposed to air when heated.

NGR's recycling solution: NGR recycling machines with an output range from 20 to 2,000 kg/h feed the material to the extruder by an integrated cutter-feeder, which consists of a slow rotating cutter shaft with knives that cut against fixed knives like a scissors and a feeding zone that conveys the material to the extruder without pre-heating it.

NGR expects that with the increasing use of biodegradables, recycling of processing waste will gain further importance. So, NGR see themselves well prepared for the actual and future demands of these applications.



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Engineering

REIFENHÄUSER EXTRUSION GMBH & CO. KG

Foundation
- 1911

Turnover
- 450 million €

Employees
- Approx. 1,200

Branches
- Machine building for the plastic processing industry

Key materials
- All kinds of plastics
- Wood Polymer Composites (WPC)
- Biopolymers

Key products
- Extrusion lines
- Compounding lines
- Twin Screw Extruders
- Single Screw Extruders

Reifenhäuser
The Extrusioneers

The Company
Innovative force as a motor for success

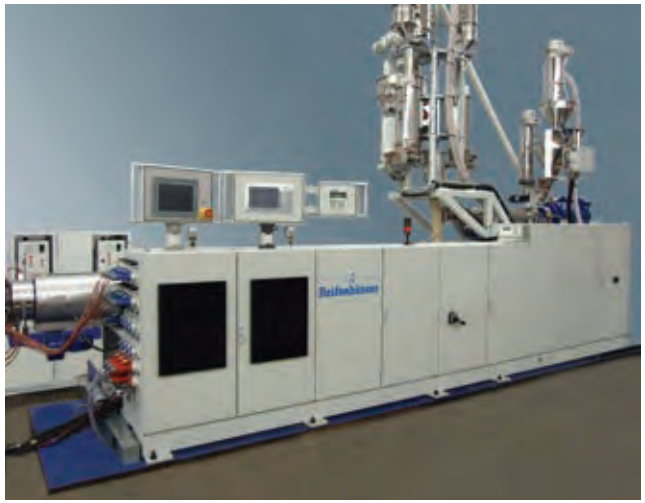
Constant research and development of Reifenhäuser EXTRUSION's line concepts are the focus of the leading manufacturer of high performance extrusion systems. The resulting innovations ensure the company's competitive edge worldwide. The use of new raw materials, in particular, and the associated changes in process technology require ever new solutions.

The benefit of its customers is always given the highest priority in all actions and considerations of Reifenhäuser EXTRUSION. Competitive advantages are generated from its employees' creativity, from superior and economically efficient technology, from speediness and convincing customer service.

The comprehensive portfolio includes extrusion lines for thermoforming sheet, cast film and WPC in addition to extruders and components. Future-oriented products, market-driven strategies and direct relationship with customers are ideal prerequisites that allow rapid and direct response to changes in the marketplaces.

Products:

Since many years, Reifenhäuser began to focus on the extrusion of wood fibre reinforced plastics. Depending on the requirements, different types of extruder-systems are used.



Direct-Extrusion BiTrudex 115 II.

Reifenhäuser
The Extrusioneers

The basic component of Reifenhäuser WPC production lines are "Bitruder" twin-screw extruders. Available in market-conforming sizes from 65 to 135 mm screw diameter and provided with parallel, counter-rotating intermeshing screws they offer ideal prerequisites for the processing of wood fibers and thermoplastic materials such as PE, PP and PVC.

Beside compound extrusion, Reifenhäuser is increasingly placing the future-oriented, flexible direct extrusion process. This technology combines mixing, melting and direct processing of the individual components into the final product (profiles, pellets) in a single operation.

The latest developments in direct extrusion enable higher extrusion capacities than common compound extrusion systems. The "Bitrudex" direct extrusion technology is the basis of such an efficient WPC-production-process. Key components are a single-screw extruder and a counter-rotating twin-screw extruder combined to form a cascade-like assembly. This design enables fibres to be processed with about 10 % humidity at speeds at a broad recipe variation. Up to 80% wood are extruded at high output rates. In addition, this process allows the production of high-strength, UV-stable WPC profiles with PMMA as polymer matrix. The Bitrudex-system itself requires less space and has lower energy consumption than comparable compound extrusion system.

The WPC-portfolio includes an in house tooling-design, broad research and development experience, a lab-line for trials as well as world-wide-service.

Engineering

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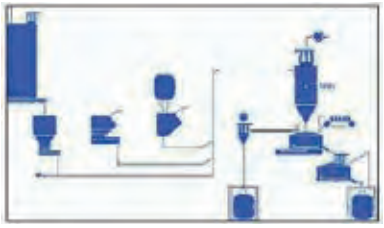
ZEPPELIN SYSTEMS GMBH ZEPPELIN REIMELT GMBH HENSCHEL MIXING TECHNOLOGY

Company
- Network of locations worldwide: approx. 50
- Own subsidiaries worldwide: 19

Employees
- 1,100

Key products
- Mixing and Compounding systems - installed worldwide: 20,000
- Bulk materials handling systems - installed worldwide: 10,000



Company

For more than 50 years the business Unit HENSCHEL Mixing Technology (Kassel) of the Zeppelin Reimelt GmbH, since 2009 a member of the Zeppelin Group (Friedrichshafen), has been developing, producing and supplying mixers, complete systems and compounding system for bulk materials in the plastic processing and chemical industry worldwide.

Each system for mixing, preparing, coating, granulating and compounding is laid out individually according to our customers' requirements – as a turnkey solution from the raw material supply to the semi-finished or final product. Our comprehensive know-how stand for a system concept without interface. This also comprises the development of integrated software solutions for a smooth process automation.

In our own laboratory, our experts develop and execute new systems and are available to provide consulting service and execute tests on behalf of customer. Based on the permanent dialog with the raw material producers and processors, our employees are always on the current standard of knowledge.

Material

The specific properties of raw materials, such as wooden flour, natural fibres or starch have to be considered when designing systems for the production of bioplastic-compounds. Next to the immanent temperature sensibility also the selection of thermal-plastic binders is essential for the processing temperature when compounding natural fibres. Besides the mostly different melting points and viscosity of the polyolefins, also the use of PVC as carrier represents a demanding challenge for the processing.

Bioplastic Composites demand the highest standards of filter technology. Due to the very specific raw material characteristics with a high degree of humidity of more than 10%, low particle weight and permanent explosion risk, only perfectly dimensioned aspiration systems will work effectively.

Objective of this processing is the production of an homogenous, dust-free and free-flowing agglomerate with a defined residual moisture, based on raw materials with almost any particle geometry. Only these material characteristics ensure a perfect processing in reproducible high quality for further process steps.

Products

Heater-/Cooler mixer combinations type FM/KM and FM/HM with very specific design features are used for the agglomeration of a wood-polymer-mixture to a processible compound. With this technique the batch operation also enables processing of raw materials with a high moisture content of more than 10% without pre-drying. This again increases the economic efficiency considerably compared to other granulating systems.

For this purpose, Zeppelin Reimelt offers systems with unique advantages:

- Surface properties of the end product
- Fracture behaviour of the profile
- Dye yield
- Throughput of extrusion

The system design is based on product properties, required throughput and feeding mode of the mixer.
The scope ranges from strictly manual feeding of all components to a fully automatic storage, conveying and weighing system.
Zeppelin Reimelt offers know-how for a broad concept and delivers a turn-key system solution which is perfectly designed for the requirement – everything from a single source.
Our specialists are at your disposal for expert advice from a first concept to handing over a complete operational system.
With the knowledge of a multitude of delivered systems, Henschel offers a special solution for this application, too:

- Anti-static, steam-permeable filter
- Insulated and electric heated housing and wiring
- Pressure-resistant design
- Integrated explosion-suppression systems
- Quick-release flaps for ventilation cables
- Components according to ATEX

A superior concept

The Henschel Compounder RHC offers the solution for this complex task by using novel screw elements which have been specially designed for the compounding of natural fibres.
Filling degrees of up to 70% can be realised due to high volume based on OD/ID ratio of 1.66 at highest flexibility in formulation design as well as choice of raw materials. With a length of the process unit of 48 D the filler is being added through two side feeders and mixed into the polymer melt in different places. For degassing of a moisture content of up to 12% specially developed degassing side feeders are installed additionally.
The single screw extruder ESE with a process unit of merely 8 D provides the necessary pressure build-up before pelletizing system or die respectively and provides nearly unpressurised operation inside the compounder. The material specific product properties can thus be improved significantly compared to conventional systems.
Only this method of gentle processing enables an extremely high output with an specific energy consumption less than 0.2 kWh/kg which cannot be realised with comparable systems.

Lifetime of the screws of up to two years and the barrels of up to four years can be realised by a powder-metallurgic coating of screw elements and barrels. This coating is applied by hot isostatic pressing at a temperature of 1,400°C and a pressure higher than 1,000 bar.

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ZERO WASTE SYSTEMS LIMITED

Foundation
- 2004

Branches
- Composting process

Key products/services
- Zero Waste Manual
- Composting and fertilizer equipment turning waste to a resource

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Company

Zero Waste sells and engineers Zero waste systems (Manuals), Composting Equipment, Software and Fertilizer processing plants (City and Foodservice Waste into Fertilizer). Waste into a resource and thus income!

We set up licences for Zero Waste approaches for Airlines, Hospitals, Venues, Hotels, Restaurants, Schools, Universities, Colleges, Fast Foods, Aged Care, Office buildings, Food Courts, Child Minding facilities, Coffee Shopes, Bars, Night Clubs, Stadiums, FMCGs, CPG`s, Cruise ships, Military, Institutions etc.

Zero waste is not only an ideal; it is a pressing imperative as we deplete our natural resources at ever increasing rates with resultant output of toxic and destructive leftovers increase. The term zero waste for ourselves and our clients is not to just describe a philosophy of life but it is a prescription for practical action and enhancement of our clients operation and its impact on the environment.

We supply end to end zero waste solution which allows us to engage customers initially on the basis of a zero waste system which gives them the zero waste vision. Our ability to then provide all compostable packaging requirements through prototyping to production to meet the customer‘s exact specification and the provision of composting machinery and the control systems and consultancy services to implement a zero waste methodology ensures that our product offering will be reasonably ‚sticky‘ with customers ensuring guaranteed repeat business in the short to medium term.

This is why our company has rethought the end to end approach to packaging and it disposal and can redeploy your existing resources and redefine your packaging into a sustainable resource.

Zero waste and zero material redundancy in the ecosystem is our ideal and is our capability. At every level in the natural world we see usefulness through reuse, recycling and reintegration of resources. Zero waste is the philosophy of insuring that no leftovers from any process become waste or unwanted output at any stage in the value chain. All organic materials such as our packaging, food or beverages are reused in our processes as an input into organic fertilisers.

- Zero waste is an ideal and also an imperative that will become more pressing as our usage on natural resources increases and out output of toxic and destructive leftover and avoiding landfill issues increases.
- It is the collection and capture of all excess food and compostable packaging used in any facility foodservices and to be completely return to nature as compost within 15 days, primarily on site!

Products

As one of earths’ oldest processes, composting is the most effective means of stabilizing and converting biodegradable waste. The rich byproduct is therefore safe and replenishes nature so that it can sustain a growing population. If this process is implemented properly, it will not only improve the environment and reduce pollution, it can replace an expensive and hazardous waste stream with a very valuable product.

Email us for project informations and case studies.

Agencies - Associations - Clusters - Councils

Agencies
Associations
Clusters
Councils

BELGIAN BIOPACKAGING VZW / ASBL

Foundation
- 2006

Branches:
- End-of-life options
- Information and news exchange on bio-packaging and/or other compostable products made from renewable materials

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Dirk Wens
President

BELGIAN BIOPACKAGING

Association

The Belgian BioPackaging association was founded in 2006 and was the result of initiatives taken by companies involved in the production or use of compostable packaging made from renewable resources.

Services

The main target of the association was and still is to get the green waste bin open for certified compostable packaging and disposables.

Although not yet realised, the Belgian BioPackaging association obtained with targeted lobbying work some important modifications to the local waste legislation and supported the creation of the first law (royal decree) in Europe that defines the terms “compostable”, “home compostable” and “degradable in the soil”. This same law prohibits the use of the term “biodegradable” on the packaging.

Where the end-of-live of the products was our first focus, we now decided also to give more attention to the organic origine of the raw materials, the renewability of the basic material.

The Belgian BioPackaging association is a platform for its members to share information and exchange news on bio-packaging and/or other compostable products made from renewable materials (and not only bio-plastics).

Club Bio-plastiques

Association Française pour le Développement des Bioplastiques

Association

The Club Bio-plastiques is the branch association representing the entire value chain of the bioplastics’ industry, from renewable raw materials to end of life. It supports the interests of its members regarding the promotion and development of bio-based plastics.

The association is actively involved at the european level.

Services

To support the interests of its members regarding promotion and development of bioplastics.

To insure bioplastics technical knowledge thanks to its members’ expertise.

To help building a new environmental friendly business development through its network representation.

Courtesy of Biolice, Novamont, SPhere.

CLUB BIO-PLASTIQUES

Foundation
- 2007

Employees
- 1

Branches
- Bio-based plastics
- Biodegradable and compostable plastics
- Packaging
- Mulching
- Composting
- End-of-life options
- LCA

Key products/services
- Club Bio-plastiques supports its members’ interests regarding promotion end development of bioplastics.

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CLUSTER BIOPOLYMERS/ BIOMATERIALS

Foundation
- 2006

Employees
- Cluster management: 2

Network
- 150 companies
- 40 research facilities

Branches
- Suppliers of renewable raw materials
- Biotechnology
- Bioplastics manufacturing
- Biopolymer processing and compounding
- Different end user industries

Key services
- Technology transfer
- Project initiation and support
- Funding support
- Public relations
- Workshops

Contact

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Dr. Ralf Kindervater

Biopolymers Biomaterials
THE CLUSTER

Cluster

The Biopolymers/Biomaterials cluster was established in 2006 under the overall management of BIOPRO Baden-Württemberg with the objective of participating in the BioIndustry 2021 competition run by the German Ministry of Education and Research (BMBF). In May 2007, the cluster was chosen as one of five winners. The goal of the Biopolymers/Biomaterials cluster is to effectively and sustainably support the development process of biotechnologically produced source materials for polymers and materials. Furthermore, the cluster aims at accelerating the application capability of these materials.

Bioreactor for experiments carried out in research laboratories. Picture: BIOPRO/Bächtle.

Activities and Services

The cluster brings together specific stakeholders along the value creation chain - ranging from raw-material suppliers to end-users – and thus accelerates the development of innovative biomaterials. At an early stage, the specific interests of clients and consumers are also taken into account. The packaging industry, the building industry, the textile and the automotive industry are among the target markets. Beneath the knowledge-based technological support, the cluster identifies factors that potentially impair the successful market entry of materials under development.

Biomaterials Design Challenge

In 2010, the cluster established the “biomaterials design challenge” – a series of annual project phases – enabling an optimal adaption of new biobased materials to the market at a very early stage. These projects aim at the evaluation of commercially available biomaterials and biomaterials under development whilst taking into account special design aspects for use in different industries. In 2010/2011, the challenge addressed the automotive sector and the 2011/2012 challenge focuses specifically on the textile application of biomaterials. The involvement of designers is also of crucial importance for connecting users and consumers. The participation in the challenge facilitates the initiation of cooperation and the launching of future projects. Further information about the challenge is available under www.bio-pro.de/tbdc.

Wood, starch, plant oils: Examples for renewable resources. Picture: BIOPRO.

BiobasedWorld at ACHEMA 2012

30th World Exhibition Congress
Frankfurt am Main · 18.-22.06.2012

ACHEMA 2012
The world’s biggest event for the process industries

ACHEMA, the world forum for the process industry and biotechnology, takes place every three years in Frankfurt am Main, Germany. This summit of leading companies and scientists is a unique platform for new perspectives, an intensive dialogue between suppliers and buyers, and the identification of synergies. The event will showcase the large variety of what is technologically possible in process engineering today.

Profile of ACHEMA 2009:
- 3,800 exhibitors from 50 countries
- 175,000 participants from 100 countries
- 30,000 executives
- 900 lectures

BiobasedWorld at ACHEMA

BiobasedWorld is an integral part of ACHEMA. This event enables you to meet key players from the whole bio-based value chain. Topics like bioenergy (e.g. biofuels, biogas, biomass), bio-based products (e.g. bioplastics, bio-based chemicals, biocomposites) are key elements of both the fair and the congress.

Networking: Technology Transfer Days

The Technology Transfer Days are a technology and knowledge-sharing event for universities, research institutes and industry. They are a marketplace for science and technology in the bio-economy where experts from academia and industry will present close-to-market R&D solutions in a series of 10-minute talks. Topics will include “Biorefinery processes for biomass conversion”, “Novel microbial, enzymatic and catalytic production systems”, “Bio-based products for new commercial applications”.

Networking: ACHEMA Partnering

ACHEMA Partnering helps you to find the right cooperation and business partners. Two months before ACHEMA you can already initiate inquiries for appointments with exhibitors and participating visitors, and you in turn can receive inquiries. An online partnering tool helps you to quickly and easily pinpoint your ideal Contact persons and arrange a 30 minute meeting with them at ACHEMA.

ACHEMA Congress

ACHEMA’s second cornerstone is the international congress, comprising more than 900 lectures. They cover all areas of process engineering, biotechnology and the bio-based economy.

DECHEMA E.V.

Foundation
- 1926

Employees
- Approx. 200

Branches
- Chemical Industry
- Process Industry
- Bio-based Industry
- Biotechnology

Key products/services
- World Forum of the Process Industry (ACHEMA)
- Organisation of > 50 events per year
- 20 task forces
- Position papers
- Research
- Continuous education
- Consulting
- Coordination of funding projects

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EUROPEAN BIOPLASTICS

Foundation
- 1993

Employees
- 10

Branches
- Complete value chain of bioplastics industry

Key materials
- Bio-based and/or biodegradable plastics

Association

European Bioplastics is the European association representing the interests of the bioplastics industry along the complete bioplastics' value chain – from manufacturers to brandowners and distributors. About two thirds of our 75 members come from Europe, the other third from the rest of the world with a strong interest in the European market.

Our vision is that bioplastics drive the evolution of plastics and contribute significantly to a sustainable society. That is why European Bioplastics aims to align the bioplastics value chain and to work in partnership with various stakeholders towards a favourable landscape enabling the bioplastics market to grow.

Activities

European Bioplastics aspires to be a knowledge partner to its members.

They rely on us as a platform to gain insights into the industry as a whole as well as into specific topics of our industry. Furthermore, we respresent their business interests vis à vis important stakeholders and create new business opportunities by connecting them to other companies along the bioplastics value chain.

One of our most important tools to achieve this is the annual European Bioplastics Conference – the overall leading global event specialised on bioplastics with around 400 visitors each year. More information is available on the conference website: en.european-bioplastics.org/conference2012

Our industry is growing dynamically around 20 percent per year. By providing a strong common platform, European Bioplastics will ensure that the European bioplastics industry and the European market will continue to thrive in the future.

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EUROPEAN INDUSTRIAL HEMP ASSOCIATION (EIHA)

Foundation
- 2005

Members
- Regular members: 8
- Associate members: 74

Key services
- Effective lobbying at the European Commission in Brussels
- Consulting
- Networking
- Huge EIHA database, more than 300 presentations, reports and documents

Association

EIHA was originally founded as an association of the members of the European Hemp industry. Regular members include primary Hemp processors in the EU. Associate members may be associations, research organisations and companies and individuals working in the area of Hemp and other natural fibres. Founded in 2005, EIHA today has 8 regular and more than 74 associated members from 28 countries. EIHA was founded to give industry a voice at the European Commission in Brussels. It has rapidly become a respected industry association that provides effective lobbying and serves as an information bank.
The annual EIHA conference (www.eiha-conference.org / more than 150 participants from 30 countries) has become an attractive opportunity for members and visitors to meet, learn about developments and exchange views with their colleagues. The conference is the most important event on industrial Hemp – worldwide!

European Hemp Fibres are available for your bio-based products: Today, China, Canada and Europe are the main Hemp cultivation areas in the world. In 2010 the total cultivation area in the European Union was around 10,000 ha. These areas produce around 24,000 t Hemp fibres. All by products like shivs (woody part of the Hemp stem) and dust are used. Main countries for Hemp production are France, UK, Germany, The Netherlands and Poland. Hemp fibres, ready to use in your bio-based products are price competitive to other domestic and exotic fibres for technical applications. Different qualities are available.

European Hemp fibre is currently used mainly in technical applications like speciality paper (cigarette paper, technical filters), insulation material, natural fibre reinforced plastics (automotive, industrial and consumer goods), mulch and cultivation fleeces. Especially insulation and plastic reinforcement show promising market increases. Different options for feeding Hemp fibres in injection moulding processing are available today.
The EIHA Hemp processors produce on average each year between 10,000 and 15,000 tonnes of technical Hemp fibres. As Hemp is an annual crop this quantity can be easily increased according to demand.

Please find the Hemp processors for your demand on www.eiha.org

Pictures (left to right):
Winter & Linotech, Hock, Lotus cars.

Contact

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Michael Carus
Managing Director

FACHAGENTUR NACHWACHSENDE ROHSTOFFE E.V. (FNR)

Foundation
- 1993

Employees
- 76

Branches
- Funding
- Advisory

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Agency

The Fachagentur Nachwachsende Rohstoffe e.V. (FNR) is promoting the use of agricultural and forest resources on behalf of the Federal Ministry of Food, Agriculture and Consumer Protection (BMELV). FNR coordinates activities on renewable resources in Germany.

FNR is the central coordinating agency in Germany for the funding of research, development and demonstration projects. However, its tasks also include providing information and advice to a wide range of different targets groups as well as supporting the market introduction of products made from renewable resources.
By means of various publications and events, FNR not only ensures that specialists can keep up-to-date with the latest scientific developments, but also increases public awareness of renewable resources.

Activities

As part of the funding programme „Renewable Resources“ and the „Directive on Bioenergy Demonstration Projects”, the BMELV, through FNR, funds about 500 research, development and demonstration projects on renewable resources each year. The aim is to make domestically produced renewable resources a realistic and viable alternative to fossil fuels.
In case when products are ready for the market but unlikely to be competitive as yet, the BMELV helps with the market introduction through specific funding initiatives.
The activities of FNR received major boosts by the Federal Government´s action plan for the industrial use or renewable resources which was adopted in 2009. Especially for bio-based raw material including natural fibre reinforced plastics and wood-plastic composites an own action area was defined. Therefore, the biopolymer network was established as the Information und Communication Platform for Science, Industry, Politics and Public. The network is coordinated by FNR with the objective to increase the proportion of bio-based materials in total plastics production in Germany while also taking into account a holistic and case-specific life cycle assessment.
Since 2003, bioenergy has been one of the major focuses of FNR´s advisory services. This service targets people who operate bioenergy plants, those planning them and those wishing to invest in them, as well as at consumers who are considering using renewable energy from biomass.

The Building and Home advisory service is intended for house-builders, architects and craftsmen who wish to use the wide range of innovative products from renewable resources that are available for building, decoration and furnishing homes.
In 2010 FNR established an additional advisory service especially for communities that are interested in the usage of bioenergy and products from renewable resources.
On European level FNR is coordinating several EU-projects in the field of renewable resources.

Agencies - Associations - Clusters - Councils

Cluster

FiMaLin® is the structuring cluster of companies for the technical flax/ composites agro-industrial supply chain dedicated to eco-designed products that incorporate high-performance flax fibres.

Activities

FiMaLin® is leading the way to eco-composites, which have advantages like low weight, high mechanical performances, and a positive environmental footprint, allowing steel or aluminium substitution in a wide range of applications. FiMaLin® aims at pushing technical flax for composites to become the leading reinforcement plant fibre, and the third leading reinforcement fibre for composites, after carbon and glass fibres.

FiMaLin® proposes a Technical Flax and Composite Charter, a unique system of reference designed to ensure safe and reliable access to the raw material (volume, quality and traceability) as well as compliance with standards (NF-CP-T25-501). FiMaLin® helps setting up collaborative projects, and develops partnerships along the value chain from seeds to finished products, for the purpose of industrializing high performance bio-based thermoplastic composites, reinforced with flax fibre. In Upper-Normandy, the cluster is supported by the regional office for business, competition, consumption, employment and labour (DIRECCTE), and the European Regional Development Fund (FEDER).

FIMALIN [FIBRES MATÉRIAUX LIN]

Budget
- 350,000 €

Branches
- Eco-designed products that incorporate high-performance flax fibres

Key materials
- Long flax fibre and high-performance bio-based composites reinforced wiith flax fibre

Contact

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IAR

Foundation
- Industries & Agro-Resources Cluster

Employees
- 10

Branches
- Bioenergy
- Biomaterials
- Biochemicals
- Bioingredients

Key materials
- Agro-resources

Cluster

The “Industries and Agro-Resources” Cluster unites stakeholders from research, higher education, industry & agriculture in the Champagne-Ardenne and Picardy regions of France around a shared goal: the added-value exploitation of plant biomass.

The IAR cluster has defined 4 strategic fields of activity under the biorefinery concept: bioenergy, biomaterials, biochemicals, bioingredients.

The IAR Cluster puts its experience and know-how at the disposal of businesses and research laboratories wishing to exploit the wealth of plant-based assets and develop R&D projects in the field of non-food exploitation of agricultural resources

Service

The IAR cluster performs various missions:
- Management of R&D projects, from the idea… to the funding
- Coordination and networking of interregional skills
- Development of international collaborations and delegations
- Provision of information and strategic intelligence
- Promotional and public relations activities

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Agencies - Associations - Clusters - Councils

LANAUPÔLE FIBRES

Foundation
- 2006

Employees
- 4

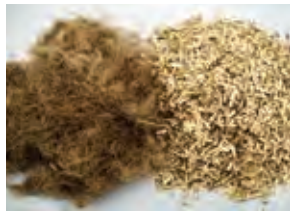
Branches
- Natural fibres industry
- R&D agritechnology and fibre processing

Key materials
- Hempstraw
- Hempseed
- Natural fibres

Key products
- Hemp fibres
- Hemp shives
- Hemp food products

Association

Lanaupôle Fibres is an initiative of the regional development of agro-industrial development of the vegetable fibres as renewable industrial raw material. Lanaupôle Fibres work together with the Coop de production Lanaufibres for the development of food and industrial products. Lanaupôle Fibres participate in research and development projects in product development with bio-based materials in multiple applications with different companies and research institutes.



- Established in 2006 and partner of Coop de production Lanaufibres
- Connector between agriculture and industry
- Lanaupôle Fibres process hemp straw and other natural fibres by mechanically separating the fibres from the shives
- Different quality grades of hemp fibres are in development for different markets
- Products are available for industrials partners & clients for further processing and applications
- Active participant in different research projects
- Member of the Canadian Hemp Trade Alliance (CHTA)

Services

- Lanaupôle Fibres supports companies in product development with bio-based materials in multiple applications and assist in business and market development.
- Fibres preparation for industrial use (technical fibres for automotive, insulation, geotextiles, textile industry, pellets, bio-plastic, etc.)
- Shives preparation for industrial use (building and construction, horticulture product, bio-composite material, bedding, etc.)

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NATIONAL INNOVATION AGENCY (NIA)

Foundation
- 2003

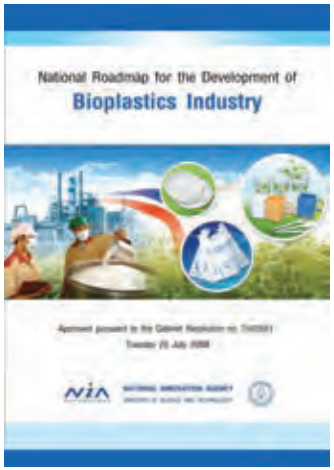
Turnover
- 328 million THB

Employees
- 35

Branches
- Bioplastics industry
- Energy and Environment
- Design and Branding

Key materials
- Bioplastics
- Food and herbs

Key products
- Stimulation of Innovation in Thailand
- Implementation of Bioplastic Road Map



National Roadmap for the Development of Bioplastics Industry.

Agency

The National Innovation Agency (NIA) was established by the Ministry of Science and Technology on October 1st, 2003. From September 1, 2009 onwards, NIA became a public organization under the umbrella of the Ministry of Science and Technology and operates under the supervision and policy guidance of the National Innovation Board. NIA has the national mandate to undertake a broad-based and systematic approach in building up the national innovation system, by fostering strategic innovation, which enhances national productivity, impacting the economic restructure and social development as well as and increasing national competitiveness. NIA recognizes Bioplastics as one of the most important strategic innovation.

In 2006, the Thai government declared the bioplastics industry as one of the "New Wave Industries" that was strategically important to the development of the country.

Thailand's emerging bioplastics industry has great potential because the local sector has a number of strong comparative advantages. First and foremost, Thailand has abundant supply biomass and raw materials that can be used as feedstock for bioplastics production, in particular, cassava. It is the world's largest cassava exporter, producing 27 million tons of fresh cassava roots in as well as the world leading sugar producer, producing 70 million tons of sugar cane in 2009. This abundance translates into lower costs and higher availability of raw materials for the bioplastics industry. n addition, Thailand already has a well established plastics industry – with 3,000 factories producing a wide range of products for overseas customers. It is the number one plastics exporter in ASEAN and the eight largest plastics exporter in the world. The bioplastics sector can tap on the capabilities, network and resources of this existing industry to rapidly grow and develop.

The national roadmap was drawn up and subsequently approved by the Thai Cabinet in July 2008. The Cabinet also assigned the National Innovation Board of the NIA to oversee the implementation of the roadmap and allocated a budget of 1.8 billion baht for its five-year plan (2008–2012). It outlines four major strategies, namely:

- Creating sufficient supply of agricultural raw materials as bioplastic feedstock
- Developing new technologies through supporting the strategic research and development
- Building new and innovative businesses
- Establishing a robust supportive infrastructure including supportive policy and standard and testing

NIA's Role in Development of Bioplastics Industry in Thailand

The Bioplastics roadmap also calls for the integration and close cooperation of the government, the private sector and the research community.

Agencies - Associations - Clusters - Councils

Since the implementation of the roadmap, various support programs, incentives, initiatives and infrastructure have been put in place in order to create a conducive environment that encourages investment, commerce creation and innovation. The end goal is to enable Thailand to establish a commercially viable and sustainable bioplastics industry which can compete on the international stage. Some of the implementation activities include:

- Creation of the Research and Innovation Helix Program for Bioplastics which provides funding for 89 industrially targeted research projects
- Establishment of the Thai Bioplastics Industry Association (TBIA) which has now 50 members
- Provision of technical and financial support to Thai companies to undertake 22 innovation projects in bioplastics
- Development of Thai industrial standards for compostable plastics and bio-based plastics by the Thai Industrial Standards Institute
- Establishment of testing laboratories for biodegradable plastics by the National Metal and Materials Technology Center and the Thailand Institute of Scientific and Technological Research
- Introduction of the highest tax incentives for the bioplastics industry by the Board of Investment
- Close cooperation with other international bioplastic organizations including German Technical Cooperation (GTZ), European Bioplastics (EuBP), Japan BioPlastics Association (JBPA), Korean BioPlastics Association (KBPA) and Environmentally Biodegradable Polymer Association Taiwan (EBPA)
- Organization of the 3 international bioplastic conferences and exhibitions for every 2 years as InnoBioplast 2006 to 2010

NIA as Thailand's Bioplastics Focal Point

In order to create the global market and business opportunities for bioplastics in Thailand, NIA is ready to support local and international partners from both industry and academic followings:

- Provide information of suppliers of bioplastic products from TBIA members
- Introduce potential business and research partners
- Facilitate essential guidelines on investment incentives, market opportunities and regulatory framework
- Update the progress of Thailand's Bioplastics Roadmap

The importance Bioplastics web sites in Thailand:
www.nia.or.th/bioplastics
www.tbia.or.th/home.php
www.bioplasticthailand.com

Tappy – The mascot of innoBioPlast event, inspired from tapioca.

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NNFCC

Foundation
- 2003

Branches
- Bioplastics
- Renewable packaging
- Life cycle assessment
- Labelling
- End-of-life options
- Consultancy

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Agency

The NNFCC is the UK's National Centre for Biorenewable Energy, Fuels and Materials. We are committed to the sustainable development of markets for biorenewable products. We promote the benefits of biorenewable energy, fuels and materials for enhancement of the bioeconomy, environment and society.

The NNFCC has earned a unique position and reputation as the UK's leading authority in biorenewable technologies and their applications. Our commercial services have been tailored to assist organisations in understanding the opportunities and overcoming the challenges presented by the emerging biorenewables sector.

The NNFCC works at the forefront of the emerging field of bio-based energy and its intrinsic connection with chemicals and materials. We have an excellent track record in the development of the market because of our relationships with Industry, Government and Research Institutions, providing tangible benefits to everyone in the sector.

We are focused on providing knowledge along supply chains and across biomass based sectors. Our core services are analysis and assessment of technology development and intellectual property, supply chain dynamics, market development and opportunities, feedstock availability and sustainability as well as end of life options.

If you want to develop bioplastics in the UK, talk to us first:
- European Bioplastics CEBON member
- Joint development of UK Home Composting logo and test method
- Facilitator for UK Renewable Packaging Group
- Helped setup supply chain for bio-based packaging to London Olympics
- Steering group on Defra projects on Oxodegradables and Bioplastics

Agencies - Associations - Clusters - Councils

Council

The Ontario BioAuto Council, headquartered in Guelph, Canada, is an industry-led, not-for-profit organization established in 2007 to link chemicals, plastics, manufacturing, auto parts and automotive assemblers with agriculture and forestry.

The Council's membership includes large Canadian auto parts companies who manufacture and sell products around the world. Foreign membership is attracted from multi-national industrial biotechnology, chemical and agri-business companies wanting to partner with Ontario's manufacturing sector to develop global markets for biobased products.

The Council also links industry with leading universities and provincial and international centres of research excellence in bioplastics and biocomposites. Auto21, The National Research Council of Canada and FP Innovations are a few of the important research links.

The Ontario BioAuto Council established a Commercialization Fund in 2007 with initial start-up funding of $ 6 million from the Province of Ontario. The fund helps to diminish the risk for companies commercializing biobased products and processes using emerging green technologies (e.g. biotechnology, nanotechnology, green chemistry and material science). Funding is eligible to Ontario-based startups, small and medium enterprises and multi-national companies who typically partner with international biopolymer and biochemical suppliers in the product and market development process.

The initiatives of the Council and its Commercialization Fund focus on four major priorities:
- Improving the global competitiveness of Ontario's manufacturing sector – by developing new products that can better compete on price, performance and environmental footprint
- Reducing greenhouse gas emissions – by using renewable-based bioplastics, biochemicals and high performance natural fibre composite materials that can reduce vehicle weight and improve recyclability
- Reducing the use of toxic chemicals in production processes and consumer products
- Increase market demand for bioplastics and biochemicals across industry sectors

The Council also establishes partnerships between Ontario's global automotive and manufacturing sectors and similar sectors in the US, Europe, Brazil and Japan. Through these partnerships it hopes to accelerate the commercialization of new technologies and build global market demand.

ONTARIO BIOAUTO COUNCIL

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SINDIFIBRAS – SYNDICATE OF PLANT FIBER INDUSTRIES OF THE STATE OF BAHIA

Foundation
- 1977

Employees
- Approx. 600,000 small holders and farmers

Branches
- Natural fibres: sisal, piassava and coconut

Key bio-based products
- Products derived from sisal, coir and piassava fibres
- Injection molding composites made of synthetic resins with Brazilian natural fibres

Contact

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Company

The Natural Fibres Industry Union in the State of Bahia brings together companies in the areas of natural fibres, mainly sisal, piassava and coconut. It has contributed to developing the sector and promoting natural fibres around the world, offering support for relations between associates, contributors and government together with businessmen in the area.

The Brazilian Sisal: Brazilian sisal fibres are strong, light, natural and biodegradable. The agricultural sector is the largest sisal twines consumer, which is widely used for tying up bundles of hay. Other important products are: sisal twine for packaging, sisal pads, sisal rugs, carpets or handicrafts.

New uses for sisal: natural fibres in high technology industries

Composites made of synthetic resins with brazilian natural fibres are ideal for substituting products such as glass fibre and asbestos cement and in manufacturing components for the car, property, furniture, nautical and aeronautical industries. Industry can have lighter, resistant and recyclable products with brazilian natural fibre composites, establishing a healthy relationship with the environment.

The Brazilian Coir: Dried and green coir fibres can be used for mats, brushes, pads and even brake linings for cars and footwear items. Furthermore, they show advantages as insulating material for partitions, satellite dishes, air filters, anti-noise covers and acoustic linings.

The Brazilian Piassava: Piassava is native to Brazil and develops in a privileged ecosystem with ideal temperature and humidity levels. Some of its features are its quality and quantity in production and processing and its non-elastic, highly flexible behavior. Its main applications fields are: brooms for home and industrial use, naval tying ropes and thermal insulation applications.

SPI BIOPLASTICS COUNCIL (BPC)

Foundation
- 2008

Employees
- 2

Branches
- Comprehensive bioplastics value chain

Key materials
- Bio-based and/or biodegradable plastics

Contact

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bioplastics council
a special interest group of spi

Council

The SPI Bioplastics Council (BPC), a special interest group of SPI: The Plastics Industry Trade Association, was launched in 2008 to promote the development of bioplastics as an integral part of the plastics industry in the United States.

The BPC's mission is to:
- Educate the plastics industry, government and value chain
- Articulate clear and consistent descriptions of the different bioplastics options
- Provide strategic advice to the plastics industry, government and the value chain and promote harmonization of environmental policies
- Member benefits include:

- Influencing bioplastics policies and practices for the industry
- Monitoring federal, state and local legislation impacting the bioplastics industry
- Working with government agencies and organizations to harmonize policies and practices that might impact the bioplastics industry
- Networking and connecting with other leaders in the bioplastics industry
- Working collectively to grow the bioplastics industry
- Educating the plastics industry, government and value chain about bioplastics
- Developing guides on bioplastics terminology, industry statistics and others
- Joining the Council's committees and subcommittees and setting direction for the Council
- Participating in meetings and gaining insight from guest speakers on current bioplastics issues.

Membership is open to companies that manufacture bioplastics resins or additives, distribute bioplastics, process bioplastics or manufacture bioplastics equipment and are actively engaged in the U.S., Canada and/or Mexico.

For more information about the Bioplastics Council and its activities or to join, please go to www.bioplasticscouncil.org.

Agencies - Associations - Clusters - Councils

TBIA
Thai Bioplastics Industry Association
www.tbia.or.th

Thai Bioplastics Industry Association (TBIA)

With strong support from the National Innovation Agency (NIA), the Thai Bioplastics Industry Association (TBIA) was founded on the May 22nd, 2007.

TBIA Vision: Thailand to be a regional leader for the commercial application and development of bioplastics, contributing to environmental protection by better waste and GHG emission management.
TBIA Mission: TBIA strives to be a regional leader in bioplastics, in which the stakeholders work together in an open and collaborative manner and support the industry through:
- Encouragement of investment in bioplastics industry
- Creation of public awareness on bioplastics
- Development information on markets and technologies as a center of knowledge
- Facilitation of conformity with global standards on bioplastics by testing and certification
- Promotion of networking among members, academic & research bodies and international organizations in bioplastics
- Advocacy with government in policies and strategies supporting bioplastics industry

A Bioplastics Hub for ASEAN – Thailand's Innovative Opportunity: Thailand is a major exporter of key agricultural products including cassava, rice, sugar and rubber. It is interesting to note that glucose can be produced at a highly competitive price in Thailand because the raw materials, particularly cassava roots, are in plextiful supply estimated about 27 million tones per year. Potentially this productivity could be still further increased. Additionally, the cost of glucose production from cassava costs could be reduced with the state-of-art anzyme technology in the near future. Low production cost for a basic feedstock creates a major opportunity for Thailand to establish production bioplastics resins using glucose from cassava as raw materials. Futhermore, Thailand has a strong downstream industrial demand to absorb production of biodegradable bioplastic, e.g. plastic bags, food packaging, agricultural films as well as engineering parts for the automotive and electrical industries.
In order to assess Thailand's potential for producing biodegradable plastics from cassava; a feasibility study, initiated by the National Innovation Agency (NIA), was conducted by Stern Stewart and Co. sponsored by Sanguan Wongse Industries Co. Ltd, which is a leader in production of modified starch from cassava. This study showed that cassava starch as a feedstock for the Thai bioplastic industry was 30% cheaper than US corn starch. Also, construction and manufacturing costs in Thailand would be 30% cheaper than in more developed countries.
Therefore NIA proposed to establish Thailand as the "Bioplastics Hub for ASEAN", firstly by supporting concerned industry sectors in technology acquisition, technology licensing, joint investment, R&D coordination, market development and human resource development. The first successful step is to support the recent establishment of an industry grouping, the "Thai Bioplastics Industry Association (TBIA)"

THAI BIOPLASTICS INDUSTRY ASSOCIATION (TBIA)

Foundation
- 2007

Members
- 50

Branches
- Bio-Business, Energy and Environment

Key materials
- Bioplastics

Key products/services
- Promotion of bioplastics Innovation in Thailand
- Implementation of Bioplastics Industry

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VHI VERBAND DER DEUTSCHEN HOLZWERKSTOFF-INDUSTRIE E.V

Foundation
- VHI – 1920
- Working Group WPC – 2005

Branches
- Particleboards
- Fibreboards
- Plywood
- Wood Polymer Composites (WPC)
- Internal doors

Key products
- Terrace flooring
- Facade profiles
- Window sills and others

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Contact person

Dr. Peter Sauerwein
Executive Director

Association
The Association of the German Wood-Based Panel Industries (VHI) represents the common interests of manufacturers of particleboards and fibreboards, plywood, wood polymer composites and internal doors to the public, the government bodies and other economic sectors in Germany and abroad.

The latest professional group under the roof of the VHI is working on wood polymer composites. Leading Central European manufacturers of this new material joined the VHI in 2005 to primarily coordinate the research on wood polymer composites, to initiate research, to facilitate the market entry of WPC-products by means of marketing and to create a quality seal.

Material
VHI's specific fields of activity are inter alia:
- Support of the business forums "particleboards and fibreboards", "plywood", "wood polymer composites" and "internal doors" as well as of the committees for "technology" and "raw materials".
- Consulting on the fields of economy, technology and politics
- Initiation of research projects and market studies
- Specialist statements regarding European and national draft guidelines, -laws and -regulations
- Representation of branches in committees of public bodies, research institutions, national and European standardization bodies, professional associations and other relevant institutions
- Industry oriented public relations and marketing

Products
The German wood-based panels and inner door industry produces an annual turnover of 5,5 bn Euro (2011) with 16000 employees. The production amounts to 6,5 mill. cbm of particleboards, 3,8 mill. cbm of fibreboards as well as 130,000 cbm and about 5,9 mill. internal doors.

Agencies - Associations - Clusters - Councils

Association
Woodfiber Plastic Composite Committee (WPCC) is a subordinate organization of China Plastic Processing Industry Association (CPPIA). WPCCCPPIA is a professional, non-profit, self-discipline voluntary organization. The entire team and industry will pull together to make WPC into a well functioning, seamless Chinese organization for the sake of a better world tomorrow.

To develop a strong link within our industry and a close link with the Chinese government for enhancing a rapid growth of the industry.

The members of WPCC-CPPIA include people from relevant WPC business such as raw material suppliers, trading companies, plastic scraps recyclers, mechanical providers, WPC manufacturers, scientists and R&D groups.

Service
1. Promotion-To promote the relevant government policies and regulations, provide feedback from the industry to the authorities concerned.

2. Surveillance-To encourage self-regulating among the members, formulate industrial standards and trading codes and expedite industry certification.

3. Strengthen-To strengthen further development, recruit more members to sustain financial support for the organization.

4. Servicing-To provide better service to our members, which includes the promotion of new raw materials, technology improvement and equipments updated, specially for energy saving technology and equipments; provide consultant service and technical supports, such as copyright application, technical improvement projects; Give suggestive solutions to our member difficulties.

5. Overseas activities-To organize overseas visit and attend international conferences.

6. IT Support-To provide IT services to our members, and build a professional WPC website.

WOODFIBER PLASTIC COMPOSITES COMMITTEE (WPCC)

Contact

Woodfiber Plastic Composites Committee (WPCC)
China
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Fax: +86 (0) 755 836 432 92
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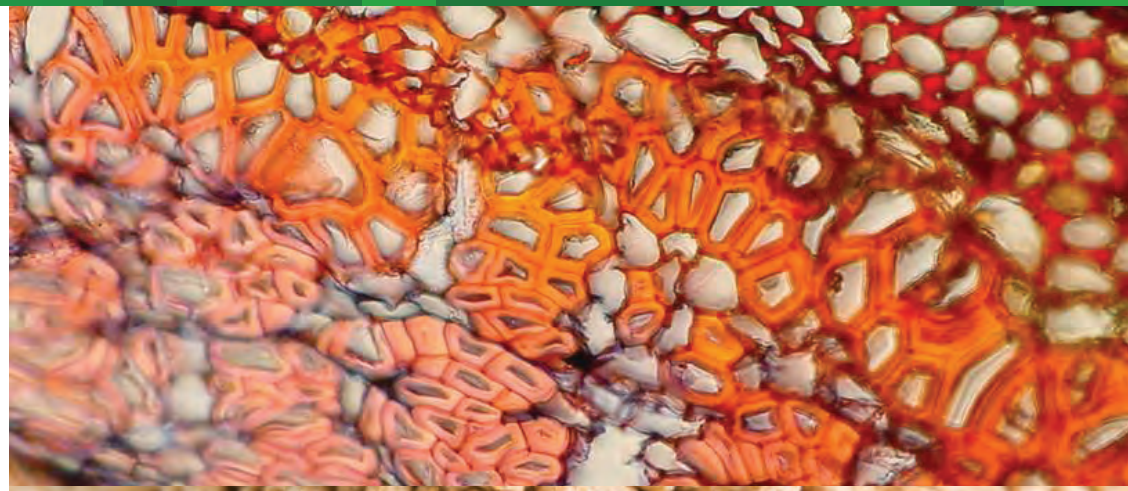
www.wpc.cn

R&D and Consultants



R&D and Consultants

AGROTECH

Foundation
- 2007

Budget / Turnover
- 11.5 million €

Employees
- 87

Branches
- Consulting
- R&D in agritechnology and foodinnovation

Key materials
- Bio-based plastics and natural fibres for multiple applications

Key products/services
- Impartial consultancy and technological services

Contact

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AgroTech

Service Institute

Agriculture provides the industry with numerous biomass-resources for multiple applications such as packaging, car composites, insulation, building materials and lots of other products. Bio-materials and bio-plastics become more and more a part of a sustainable solution in the industry.
AgroTech is an authorized technological service institute which offers impartial consultancy and provides technological services within the fields of the agriculture, horticulture and food industry. AgroTech focus on sustainable commercial production of food and other bio-based products and operates within the intersection between agriculture, horticulture and the industry creating business development through knowledge and innovation. We specialize in providing cutting edge knowledge of biology and technology. The expertise covers all links in the value-chain from field to fork, and the company is directed to suppliers of machinery, facilities and technology used in the primary production as well as food businesses. One of our core business areas is biomass for bio-energy and bio-material purposes such as bio-composites and building materials.

Services

Biomass possesses a range of basic components with interesting technical properties which can be used in multiple applications and often substitute unwanted materials being hazardous to health. New bio-products combine the demands for a positive climate print, being biodegradable, and feature lots of environmental beneficial properties.

Products

AgroTech supports companies in product development with bio-based materials in multiple applications and assist in business and market development. AgroTech participates in research and development projects towards new and unknown materials from biomass and conversion of biomass and join biomass and bio-plastic networks.
We carry out quantitative impact study on biomass resources from the agricultural sector and the Aquarius sector. We complete tests, development and demonstrations within agricultural technology, biomaterials and bioprocess technology, environmental and energy technology, the area of domestic animals and food technology and technology within the greenhouse industry.

Left to right: Hemp fibre bounded with PLA-fiber a growth medium for spicy herbs, nonwoven hemp fibre mats, reinforced bio-composite. Pictures: Bodil Pallesen.

R&D and Consultants

ASTA EDER
Composites Consulting

ASTA EDER COMPOSITES CONSULTING

Foundation
- 2011

Key services
- All involved in the development and production of composites

Key materials
- Natural fibre composites (e.g. WPC)

Contact

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Contact person

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Consulting

Asta Eder Composite Consulting (AECC) is located in Vienna, Austria. She was born in Finland,the roots of her childhood enveloped in the Finnish woods. She studied forestry in Austria and did her PhD on market opportunities of innovative wood based composites in the German speaking area.

Within the Wood K plus programme at the University of Natural Resources and Life Sciences Vienna Asta Eder worked in WPC research and development for 10 years and during this time was in charge of numerous WPC market research projects. She has written several market studies and articles on WPC. Since 2005 she is part of the scientific committee of the French WPC congress and is an active member of the Austrian WPC forum.

Services

Consultation through international WPC market knowledge

During a consultation meeting, undiscovered innovation potentials of your company in the field of WPC can be disclosed and evaluated by means of a SWOT analysis.

AECC possesses special know-how concerning methods of market research, to ensure the successful market launch of your WPC product already during its development stage. We can help you to discern the unspoken needs of your future costumers. Our market knowledge enables you to define your exact market positioning in relation to competitors and imports.

We offer well-founded reports as a basis of decision for your next innovation measures. According to the costumers wishes these can be based on idea workshops, focus groups, personal or online interviews and internet research as well as lead-user-analyses and conjoint analyses.

We offer comprehensive market consulting for composites from raw materials up to end products. Picture: Left wood-plastic composite granules, Above composite and timber decking profiles. Pictures: www.burgerfoto.com

We support you with informed business models at planning the first steps of your production and offer you extensive consultation concerning market launch, business development and the search for distribution channels.

Our core competence lies within the WPC sector, but we also welcome inquiries concerning other composites.

BIOPRODUCTS DISCOVERY AND DEVELOPMENT CENTRE, UNIVERSITY OF GUELPH, DEPARTMENT OF PLANT AGRICULTURE

Foundation
- 2008

Employees
- 25

Key materials
- Bio-based materials

Key products/services
- Research
- Development

Contact

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Director, Bioproducts Discovery and Development Centre
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Centre

The Bioproducts Discovery and Development Centre (BDDC) is a research and development service provider, situated within the University of Guelph, Guelph, Ontario, Canada. This well resourced facility, unique to Ontario, provides opportunity for companies, entrepreneurs, and research organizations to partner with university-based researchers toward development of commercial new biomaterials, biochemical and process technologies. The BDDC is staffed by graduate and post-doctoral students working in the areas of polymer science, chemical engineering, applied microbiology and advanced material science.

Services

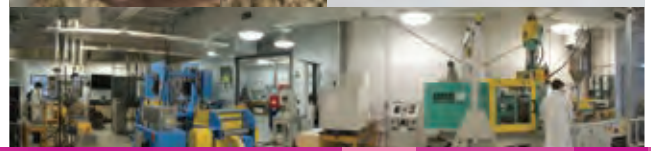
Commercial application of research results is a guiding principle for the BDDC. Innovations coming from the BDDC help companies in their efforts to reduce greenhouse gas emissions and their environmental footprint. The BDDC offers an extensive array of services for companies interested in the areas of:

- Bioplastics and bio-based Polymers
- Green Composites, Natural Fibre Composites and Biocomposites
- Sustainable Packaging
- Bio-based Nanocomposites and Nanoblends
- Lignin-Filled Thermoplastics and Thermosetting Polymer Composites
- Bio-based Materials from the Co-Products and Byproducts of Biofuel Industries
- Biomass and Biomaterials Sustainability
- Recyclability, Durability and Biodegradability Studies
- Sustainability of bio-based Materials

Undertaking R&D work at the BDDC allows companies to access a range of pilot-scale processing and characterization equipment including:

- Twin-screw extruder, injection molder, micro-compounder and mini injection molder, hot press, micro cast and blown film line, kinetic mixer, electrospinning
- TGA, DSC, DMA, UV-Vis & FTIR spectroscopy, universal testing machines (Instron), impact tester, and GPC, GC, density meter, melt flow index, optical microscope Aerobic biodegradability testing unit





CONENOR

Foundation
- 1995

Branches
- NFC
- WPC
- Construction

Key materials
- Natural Fibres
- Thermoplastics
- Fillers
- Additives
- Waste

Key products/services
- Client R&D
- Feasibility Studies
- Profile Extrusion
- Sampling of Materials & Formulations

Languages
- English, German, Swedish, Finnish, Spanish, Portuguese

Contact

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Contact person

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Industry Consultant

Beginning of 1990's Conenor started developing with its industrial partner Maillefer Extrusions and State Technical Research Center "VTT" its innovative and patented multi-rotor extruder Conex® which could extrude two or more different WPC-formulations into multilayer product structures without the need of cross-heads nor side extruders.

Independent of Conex® offering, Conenor is today acting as international industry consultant and expert in client projects for extruded natural fibre plastic composites (NFC & WPC) and waste management schemes and start-ups of new businesses.

Current examples being EU project IRCOW www.ircow.eu for improved recycling of construction and demolition waste and concept FIBRACASA™ for affordable houses from NFC www.fao.org/economic/futurefibres/news3/consultation2011/speakers/en/

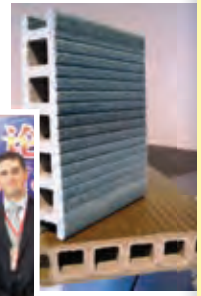
Feasibility | Product R&D

"should I enter the WPC-manufacturing and what do I need to know to decide"
- Market Knowledge & Information
- Profit / Loss Calculations
- Material Choices, Additives, Formulations
- Product Design & Dimensioning
  - Single layer
  - Multilayer
- Optional Process Equipment and their Manufacturers (OEM)
- Client R&D and sampling activities at Conex® Skill Center
  - Client formulation development & optimization
  - Material screening trials with Conex® CWE 380-1 extruder
  - Multilayer product sampling trials with Conex® CWE 500-2 extrusion line
  - Testing of samples

Consultancy | Equipment

"what should you buy and from where and how to get started"
- Selection of Equipment & Tooling from worldwide Manufacturers
  - Material preparation
  - Mixing
  - Extrusion
  - Downstream
- Technical expertise and advise for the most optimal set-up
  - Twin screw extrusion technology for standard single layer products
  - Conex® 2-rotor technology for multilayer products
- Buy-or-Make evaluations
- Purchase negotiations on Client behalf
- Training & Know-how in process control and start-ups
- Project financing services

multilayer WPC-decking boards with recycled ABS(45%) +wood (55%) inside and recycled PE or PP (35%) +wood(65%) outside




FRAUNHOFER UMSICHT

Foundation
- 1990

Turnover
- 22,9 million €

Employees
- 187

Branches
- Plastics processing Industry
- Packaging Industry
- Consumer goods and automotive Industry

Key materials
- Bio-based plastics and materials
- Bio-based monomers and polymers

Key products/services
- Development of bio-based materials, products and their processing technologies
- Pilot and small scale production of bio-based polymers and compounds
- Certified testing of biodegradability of substances, materials and residues

Contact

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Contact person

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Fraunhofer UMSICHT

Institute

Fraunhofer UMSICHT develops applied and custom-made solutions in the fields of environmental and process engineering, material and energy technology. Assuming a leading position Fraunhofer UMSICHT is committed to sustainable development, environmentally friendly technologies and innovative approaches designed to improve the standard of living and to promote the economies innovative capacity.

Fraunhofer UMSICHT is your competent partner in all phases of development and market introduction of bio-based materials. Based on our long-term scientific experience we create innovations: from the first project idea over the joint discussion of product requirements, the production of material samples to practical application tests.

Services

For industrial customers or within the scope of public funded projects we offer market research, experimental investigations, material and compound development in the fields of bioplastics, natural fibre composites bio-based foams and adhesives. Our material development is closely coupled with the optimisation of known and the research on new processing technologies.

A wide range of plastics machinery equipment in laboratory and even in industrial scale enables us to support industrial partners in large scale production implementation. Our integral material optimisation approach includes aspects like sustainability, aesthetics, design and sensory functions.

R+D Portfolio

- Development and optimisation of biotechnological processes, downstream processing
- Development of new bio-based monomers and polymers
- Material and product development
- Plastics process development
- Small scale and pilot series manufacturing of plastics compounds and products
- Polymer analyses and material testing
- Certified testing of biodegradability of substances, materials and residues
- Market and feasibility studies, technological assessments

FRAUNHOFER WKI

Foundation
- 1946

Employees
- 95

Branches
- Wood-based Panels and Wood-Polymer Composites Industry, coatings, wood engineering and construction, fire Safety, emissions

Key materials
- Wood, natural fibres, refiner fibres, Wood-based Panels, Wood-Polymer Composites, coatings

Key products/services
- Wood-based Panels, Wood-Polymer Composites, Coatings

Contact

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Fraunhofer WKI

Institute

The main research activities of the Fraunhofer Institute for Wood Research WKI in Braunschweig are the manufacture and improvement of innovative wood-based composite materials such as particleboards, fibreboards and wood-polymer composites (WPC), the development of durable coatings based on renewable resources, measurements of emissions and application of non-destructive techniques for various materials and products. In addition, Fraunhofer WKI is working in the following areas: Building physics, including natural and artificial weathering, weathering simulations, corrosion protection, evaluation of hygrothermal material properties, and fire safety.

Services

We can produce wood and natural fiber-based composites using various techniques such as extrusion and hot-pressing and determine their mechanical, thermal and physical properties according to your requirements. We have equipment for reducing wood and other lignocellulosics to chip form, for sieving and sorting as well as drying. A laboratory-scale refiner plant with a double disc refiner can be used to produce thermomechanical pulp (TMP) and chemo-thermomechanical pulp (CTMP) from various lignocellulosic materials. Resins and additives can be added to lignocellulosics using blow-line application in our refiner plant. Hollow-core profiles or tapes can be manufactured on a conical, counter-rotating twin-screw extruder (54 mm screw diameter). A parallel, co-rotating compounder, a thermokinetic mixer and a Palltruder (plast agglomerator) can be used to prepare compounds.

Current WPC research projects are:
- Use of refiner wood fibres (TMP fibres) for WPC extrusion
- Preparation of polymer blends based on engineering polymers in virgin and recycled forms
- Bonding of WPC profiles
- Coating of WPC with Water-based, solvent-free coatings

Fraunhofer WKI is an accredited testing laboratory for WPC decking according to the “Qualitätsgemeinschaft Holzwerkstoffe e.V.” in Gießen, Germany.

HOCHSCHULE BREMEN

Contact

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Institute

An important research focus in the field of “Biological Materials” is the development of sustainable materials along the value added chain from the raw materials production to the final product in combination with biomimetic aspects. For example we are looking for structures in nature which display very good specific properties and transfer them in an abstracted form into a technical composite. In this way the petioles of red rhubarb taught us a structural construction for the improvement of the impact characteristics of technical fibre reinforced composites.

Figure 1: Fracture mechanism of a rhubarb petiole during impact testing

For the production of the bio-inspired composites we try to use materials produced from renewable resources like cellulose fibres as reinforcement and biodegradable polymers.

The main research activities are as follows:

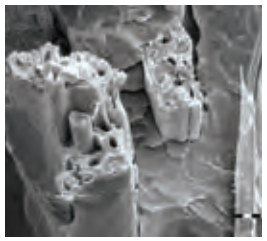
- Development of concepts for sustainable materials
- Relation of structure and properties in materials
- Bio-inspired materials & insulation products
- Natural fibres and natural fibre reinforced composites
- Adhesion and interfaces

Services:

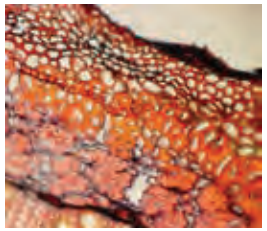
- Material & product development
- Material testing
- Research Co-operation
- Research Assignment

Equipment:

- Characterization of fibres: (i) bending and tensile testing, (ii) image analysis - fineness & length and (iii) cross section measurement with laser technique.
- Characterization of composites & polymers: (i) tensile, bending & compression tests, (ii) torsion test, (iii) Charpy, Izod & falling dart impact test, (iv) determination of fibre content, (v) melt-flow index and (vi) UV degradation test.
- Investigation of fibre/matrix interactions: (i) pull-out test, (ii) single fibre fragmentation test and (iii) peel test.
- Surface and morphological characterisation: (i) microscopy, (ii) scanning electron microscopy (SEM) and (iii) atomic force microscopy (AFM).
- Lab-scaled fibre and composite processing: (i) stem decortication, (ii) fibre separation, (iii) carding, (iv) compound development and (v) pultrusion.



SEM micrograph:
fracture surface of kenaf fibre reinforced PLA



Cross sectional view of a hemp stalk

INSTITUT FÜR KUNSTSTOFFTECHNIK

Institute

The institute of polymer technology (IKT) of the University of Stuttgart is a R&D-institute active on the fields of material science, processing and product design. Beside the research on conventional polymers, the development of new bio-based polymers and associated processing techniques is a focus of the institute.

The IKT is a comprehensive R&D partner to develop new bio-based materials and to realise new products from those materials. Combining a wide range of processing and characterisation techniques under one umbrella enables the IKT to conduct fast and effective developments for the industry.

Services

- Material development / Compounding (ZSK 25/26/40)
- Processing techniques: Extrusion, injection moulding, injection moulding compounding, film blowing, thermoforming, laser sintering
- Material characterisation: Full range of chemical-, thermal- and mechanical characterisation
- Process simulation: Extrusion-, injection moulding and thermoforming
- Initiation of funded research projects
- Consulting

Injection moulding compounder

Twin screw compounder

Tensile testing machine

Foundation

- R&D on the field of Material science, processing and product design of polymers

Employees

- 58

Key services

- Compounding
- Material characterisation
- Product design
- Processing techniques

Contact

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K.I.M.W. NRW GMBH

Foundation
- 1988

Budget
- > 5,5 million €

Employees
- Approx. 60

Branches
- Support in all areas of plastics technology

Key materials
- Thermoplastic and thermoset materials

Key products/services
- Material testing and failure analysis
- Materials Engineering / New Materials
- Surface technology
- Process engineering and development
- Joint projects

Contact

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Institute

The Kunststoff-Institut für die mittelständische Wirtschaft NRW GmbH (K.I.M.W.) combines tomorrow's scientific know-how with today's production capabilities. Our focus is on increasing the quality and economic efficiency – especially for injection moulded parts made of thermoplasic and thermoset materials. For that reason we offer a number of services for the benefit of our customers.
Our enterprise as a whole has been DIN EN ISO 9001 certified; the laboratory has been accredited to DIN EN ISO/IEC 17025.

The Kunststoff-Institut Luedenscheid

- Provides support with the selection, development and optimization of products, moulds and processes in all areas of plastics technology
- Is focused on increasing the quality and economic efficiency in the plastics industry
- Was founded in 1988 as an extended workbench and is thus one of the most experienced service provider supported by an association of shareholders of approximately 170 companies
- Currently employs a staff of approximately 60 people
- Generates an annual turnover of more than 5,5 million euros
- Offers trainee- and internships

Service

Our competences include:
- Materialselection / Material testing / Analysis
- Surface technology
- Process engineering and development
- Moulded part and mould optimization
- Joint projects, e.g. Appications of sustainable materials – technical use of bio-based materials

Activities in the field of biopolymers

- Market research – evaluation and supply of information sources, databases or studies, etc.
- Material selection with the aid of checklists
- Rating the materials with regard to the processing conditions (material preparation, plastication, flow characteristics)
- Examination of constructive and mould specific issues
- Analysis of material properties (e.g. shrinkage or warpage)
- Material tests against the background of specific requirements from different industries – e.g. odourtest, fogging, aging tests (solar simulation, weathering, climate storage)
- Implementation of selected surface and decoration processes for the verification of the practicability (varnishing, 3iTech®) and implementation of proper surface characterisations

KOMPETENZ-ZENTRUM HOLZ GMBH

Foundation
- 2001

Turnover
- 7.5 million €

Employees
- 95

Branches
- Chemical industry
- Wood working industry
- Pulp and Paper industry
- Polymer industry

Key materials
- Wood and natural fibres
- Cellulose fibres
- Thermoplastics
- Thermosets

Key products
- Wood Polymer
- Wood Composites
- Man made fibres
- Particle boards, Laminates
- Papers, Paper boards

Contact

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Contact person

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Centre

The Kompetenzzentrum Holz GmbH (Wood K plus) is a research service provider for the wood working industry as well as for the polymer- and chemical industry. Innovative timber materials, optimized production processes in the timber production industry and wood chemistry as well as

new technologies and products in the field of polymer-composites are the main research objectives of the Competence Center for Wood Composites and Wood Chemistry. The Competence Center demonstrates with its 95 full time employees one of the most powerful and biggest (wood) research institutes in Central Europe.

Material

Besides long term projects especially feasibility studies, screening studies, material characterization and contract research are being conducted for partners from the timber-, paper-, furniture-, polymer- and chemical industry.

Mainly the solution of technical problems out of the running business, but also the professional handling of orders and projects (funded and not funded projects similarly) represent the main focus therefore.

The division "Wood Polymer Composites" concentrates with its two main research areas Wood-Thermoplastic-Composites (WPC) and Wood-Thermoset-Composites on the knowledge based development of composites from wood particles, wood flour or wood fibres and polymers(virgin and recycling materials). The necessary infrastructure for mixing, compounding, extrusion and injection moulding processes as well as for the mechanical, thermal and physical characterization of composite materials is available. A professional handling of research activities assure the 20 high qualified employees of the division.

Products

The research services of the division "Wood Polymer Composites" range from small testing/characterization jobs over medium term research appointments up to long term research & development projects:

- Raw material analysis (lignocellulosics and polymers)
- Material testing, component testing (mechanical, weathering,..)
- Material/formulation development
- Compounding trials, extrusion trial, injection moulding trials

www.wpc-kongress.de

Fünfter Deutscher WPC-Kongress
10.–11. Dezember 2013

Fifth German WPC Congress
December, 10th – 11th 2013

Wir würden uns freuen, Sie zum Fünften Deutschen WPC-Kongress wieder begrüßen zu dürfen: 10. – 11. Dezember 2013.

We look forward seeing you again in 2013 at the Fifth German WPC Congress: December, 10th – 11th 2013.

Pictures: Evonik, Polymertechnik, Rotho, Möller.

Ansprechpartner / Contact

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Messe Erfurt

naro.tech

Event

The 9th International Symposium “Materials made of Renewable Resources” and the industry forum of the European Polysaccharide Network Of Excellence (EPNOE) are taking place together for the first time on 5th and 6th September 2012 in Erfurt.

The research and education network EPNOE combines 16 European research institutes from nine European countries and 22 companies from four continents. EPNOE is integrating its application-based industry forum into the naro.tech symposium.

As a communication platform naro.tech brings together international scientists, producers and users from a whole range of sectors to discuss current research results and practical reports.

The congress programme that spans industries and materials focuses on

- fibre composites
- biopolymer materials
- alternative cellulose
- Bio-based adhesives
- wood fibre materials
- sustainability

The accompanying exhibition in the congress centre’s foyer offers companies the chance to present their innovative products and services and enter into discussions with researchers and users.

Please register your contribution by 31.01.2012, using the form at www.narotech.eu or informally by email to narotech@messe-erfurt.de. You can also submit poster contributions on the topics mentioned above.

See for yourself and establish valuable contacts at the naro.tech symposium. A programme of our symposium can be found from Mai 2012 online at the naro.tech Homepage. Register soon online and secure your congress participation!

We look forward to your attendance!

Further information: www.narotech.eu

NARO.TECH

Foundation
- 9th International Symposium “Materials made of Renewable Resources” with EPNOE Industrial Meeting

Date
- 5th – 6th September 2012

Type
- Congress with accompanying exhibition

Organiser
- Messe Erfurt GmbH
- WNR – Forschungsvereinigung Werkstoffe aus Nachwachsenden Rohstoffen

Partners
- EPNOE – European Polysaccharide Network of Excellence Association
- TITK – Thüringisches Institut für Textil- und Kunststoff-Forschung e.V.
- TLL – Thüringer Landesanstalt für Landwirtschaft

Supported by
- Bundesministerium für Verbraucherschutz, Ernährung und Landwirtschaft

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R&D and Consultants

NOVA-INSTITUTE FOR ECOLOGY AND INNOVATION GMBH

Foundation
- 1994

Turnover
- 1.8 million €

Employees
- 20

Customers
- Industry: Automotive, Chemicals, Construction, Plastics, Engineering
- Consulting
- Associations
- Ministries
- Research institutes

Key topics
- Feedstock supply
- Techno-economic evaluation
- Market research
- Dissemination
- Project management
- Policy for a sustainable Bio-based economy
- Ecological assessments (Meta-LCA)

Key services
- Industrial & political consultancy
- Research & development projects
- Conferences & dissemination

More information
- You may find all information on international congresses along with information services of the nova-Institute on: **www.bio-based.eu**

Institute

The nova-Institute was founded as a private and independent institute in 1994. It is located in the Chemiepark Knapsack in Hürth, which lies at the heart of the chemical industry around Cologne (Germany).

For over 17 years now, the nova-Institute has been globally active in feedstock supply, techno-economic evaluation, market research, dissemination, project management and policy for a sustainable bio-based economy.

Services

The nova-Institute uses and creates expert knowledge along with innovative solutions to develop and advance the Sustainable use of biomass in bio-based Chemistry, Industrial Biotechnology and bio-based Products. In research & development, nova has comprehensive contacts within the wide industrial and scientific network. The communication services include conferences, the news portal for bio-based Economy incl. a newsletter and the business directory iBIB (more information: www.bio-based.eu).

Key questions regarding nova activities

What are the most promising concepts and applications for Industrial Biotechnology, Biorefineries and bio-based Products? Which political and economic framework is needed for a sustainable growth of the bio-based Economy? What are the challenges for a post petroleum age - the Third Industrial Revolution?

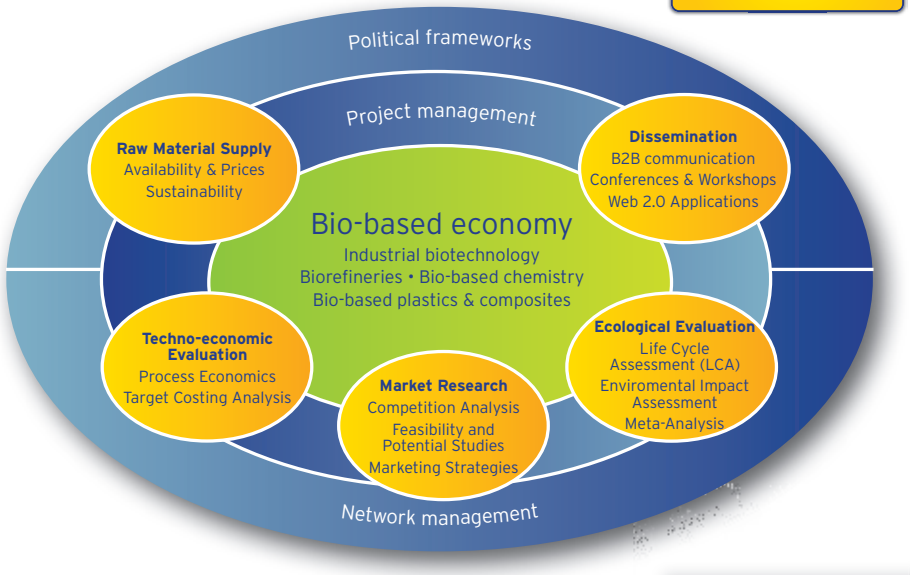
Fields of activity

With a scientific staff of more than ten experts, nova-Institute has a turnover of approx. 1.8 Mio. €/year which is equally distributed on three sectors: Industrial & political consultancy, research & development projects and conferences & dissemination.

Selected customers

Automotive industry: brose, BMW, Daimler, Faurecia, Ford, Johnsons Controls, Quadrant

Chemistry, plastics and biomaterials: BASF, FKuR, Honeywell, InfraServ, KOSCHE, LEIFHEIT, Proganic, PURAC, Teijin



Engineering: Coperion, Reifenhäuser, FERROSTAAL

Consulting: AFC Consulting (DE), BLEZAT CONSULTING (FR), Clever Consult (BE), Ernst & Young (FR/DE), meó Consulting (DE), Pestalozzi-Consulting (CH), The Textile Consultancy (UK)

Associations: AVK, CLIB2021, european bioplastics, EIHA, VHI

Ministries & Institutions: BMELV (DE), DBU (DE), DEFRA (UK), DECC (UK), European Commission, FNR (DE), FAO, GTZ/GIZ (DE), KfW (DE), NIA (TH), UBA (DE)

Research Institutes: Fraunhofer UMSICHT (DE), HS Bremen (DE), IFEU (DE), INRA (FR), INNVENTIA (SE), London Imperial College (UK), Öko-Institut (DE), RAPRA (UK), VTT (FI), Wageningen UR (NL)

Associations and bodies

The nova-Institute is a member of various international associations and committees. We are founding member of the cluster Industrial Biotechnology CLIB 2021 (Düsseldorf), member of the Steering Committee of the Federation of Reinforced Plastics (AVK), the subgroup „Natural Fibres Reinforced Plastics" (Frankfurt a. Main) and the executive office of the European Industrial Hemp Association (EIHA). In addition to this, we are member of various national and EU-wide working groups on industrial biotechnology and biomaterials.

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Managing Director
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PE INTERNATIONAL AG

Foundation
- 1991

Employees
- 220

Branches
- Automotive
- Packaging
- Chemistry
- Agriculture
- Food & Beverage

Key services
- Sustainability Consulting
- Life Cycle Assessments
- Environmental Product Declarations
- Carbon and Water Footprinting

Key products
- GaBi Software
- GaBi Databases
- SoFi Software

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PE INTERNATIONAL
EXPERTS IN SUSTAINABILITY

Company
PE INTERNATIONAL is one of the world's most experienced sustainability software, content and strategic consulting firms. With 20 years of experience and 20 offices around the globe, PE allows clients to understand sustainability, improve their performance and succeed in the marketplace. Through market leading software solutions, consulting services and implementation methodologies PE has worked with some of the world's most respected firms to develop the strategies, management systems, tools and processes needed to achieve leadership in sustainability.

Services
In the sector of Innovative bio-based Plastics and Composites, PE INTERNATIONAL offers consulting services e.g. Product Carbon Footprints, Corporate Carbon Footprints, Life Cycle Assessments (LCA) and strategic sustainability consulting. Proven software solutions, like the GaBi Software, are used to assess the environmental profile of single processes of biopolymer synthesis as well as the whole life cycle from cradle to grave. A broad experience in agricultural cultivation and processing, comprehensive databases and, where required, 'data-on-demand' form the base on which PE experts are able to assess and compare individual products and processes with common practices.

Reference Projects
- Creation & provision of Life Cycle Inventory data of plastic production
- LCA studies of bio plastic production (e.g. poly lactic acid or sebacic acid for polyamide production), use, recycling and disposal
- Research projects regarding the general environmental implications of biopolymers
- Water and Carbon Footprint studies of products related to agriculture
- Environmental product declarations (EPDs) for building materials
- Tools for supporting eco-design and energy efficiency design aimed at improving biopolymer processes, products and systems.

Key products
GaBi Software
PRODUCT SUSTAINABILITY

GaBi is the most trusted product sustainability solution for Life Cycle Assessment with over 10,000 users. Over 20 years of life cycle expertise by PE INTERNATIONAL are captured in the GaBi Databases, the largest internally consistent LCA databases on the market today, containing over 4,500 ready-to-use Life Cycle Inventory profiles.

SoFi Software
CORPORATE SUSTAINABILITY

PE´s corporate sustainability solution SoFi is a central sustainability information platform that transforms data from all corporate activities into meaningful performance information. It is a proven and mature solution that increases the efficiency of sustainability information management.

bioplastics MAGAZINE.COM

Product
The success of bioplastics MAGAZINE in the first 6 years proves that there is a real need for a trade magazine dedicated exclusively to bioplastics, i.e. plastics from renewable resources and biodegradable plastics including natural fibres. bioplastics MAGAZINE covers all topics of these bio-based plastics and biodegradable plastics, many of which fulfilling both aspects.

The magazine keeps its readers updated about the different bioplastic resins which are available and will come up in future, about chemistry, properties and availability. bioplastics MAGAZINE covers the processing techniques of these fascinating materials such as film blowing, extrusion, thermoforming, blow moulding, injection moulding etc. A large part in bioplastics MAGAZINE is dedicated to current and future applications. As of today, the lions share are packaging applications, but other industries are following. Even producers of consumer products such as covers for cellphones, laptop-computers or toys are interested in this family of materials as well as the automotive industry and many others – or they are already using bioplastics in certain products. Another quite important aspect is the political situation. bioplastics MAGAZINE reports about regulations, certifications and all end-of-life options. bioplastics MAGAZINE is THE information platform for all parties involved.

It is read by decision makers in all parts of this business, e.g. the raw material suppliers and compounders, machine and mould makers, converters, brand owners, the complete trade chain (wholesale and retail) as well as scientists and politicians, as bioplastics MAGAZINE is an independant and neutral source of information. With an average print run of 5000 (depending on large events like exhibitions or conferences) the estimated number of readers is much bigger, as many copies of bioplastics MAGAZINE are circulated or passed on to other interested readers. Since its start in early 2006 bioplastics MAGAZINE has experienced a constant, and very positive, feedback from its readers. The number of subscriptions is continuously increasing.

bioplastics MAGAZINE also organizes high class conferences, such as the 2nd PLA World Congress on 15-16 May 2012 in Munich.

The print magazine is published 6 times a year in English language. Subscribers get bioplastics MAGAZINE on their desk for EUR 149.00. This also includes access to the online archive with full-search functionality over all published issues.

www.bioplasticsmagazine.com

POLYMEDIA PUBLISHER GMBH

Foundation
- 2006

Branches
- Plastics Industry
- Packaging Industry
- Automotive Industry
- Consumer Electronics
- All Industries
- Academia
- Politicians

Key materials
- Bio-based Plastics
- Biodegradable Plastics

Key products
- Bioplastics MAGAZINE
- Conferences
- Consulting

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www.bioplasticsmagazine.com

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mt@bioplasticsmagazine.com

SKZ

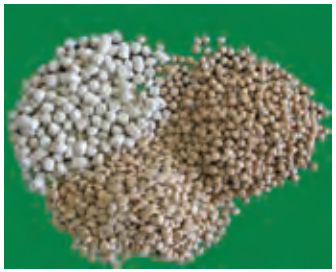
Foundation:
- 1961

Turnover:
- 26 million €

Employees:
- 260

Branches:
- Service provider for the plastics industry

Key products/services:
- Testing and Certification of materials and products
- Basic and advanced training of professionals
- Research and Development (materials, processing, testing, environmental impact)
- Certification of management systems



SKZ
Das Kunststoff-Zentrum

Centre

SKZ started 50 years ago at a time when polymers had been discovered as materials for the future. As today's biggest institute for plastics in Germany, SKZ offers practical solutions dedicated to meet your needs.

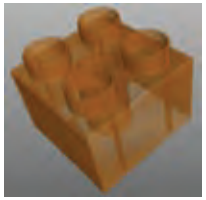
- The **research and development** is focused on the entire production chain, starting with material development, through processing and joining, to the evaluation of component properties and sustainability
- SKZ supports your product policy and provides valuable aspects for your markets by means of **quality tests and quality inspection**.
- With more than 11 000 participants a year SKZ is the European market leader in **education, professional training and knowledge transfer** in the field of plastics
- By **certifying management systems** SKZ promotes high efficiency and economic success of your company

SKZ is equipped with modern machinery and instruments for compounding, extrusion, injection moulding and joining as well as for testing of biomaterials. In addition, SKZ experts deal with various topics of material development, processing, material testing and an solutions that are relevant to the plastics industry.

Development of WPC

Since 2003 SKZ's research and development division has been working on Wood Polymer Composites (WPC). The influence of formulation and processing parameters on physical properties of the composite have been studied extensively. It was also analyzed how different processing techniques (direct extrusion, extrusion from compounds and injection moulding) influence the properties of WPC with a similar composition. In addition, joining as well as long-term tests such as weathering of WPC were performed.

Compounding of Biomaterials



The synthesis of new biopolymers is not always necessary, because already known and available biopolymers can be optimized sufficiently, for example by additives. In addition to the formulation development our main activities are concentrated on developing and optimizing necessary process technology. To achieve this goal there is a wide range of state-of-the-art compounding and extrusion equipment available, such as single screw, co-rotating twin-screw, planetary roller or ring extruder.

Injection moulding of WPC and Biomaterials

Concerning WPC and Biopolymers the complete understanding of all technical relationships and interactions around the injection moulding was achieved (e.g. in the field of hot runner systems). As for processing of Biomaterials there are two modern pilot plants with a total of five injection moulding machines available. Main topics particularly deal with part development, tool technology, process optimization and quality assurance.

SKZ
Das Kunststoff-Zentrum

R&D and Consultants

Testing of WPC and biomaterials

In case of WPC, standardization is still in its infancy, but there are already some standards, draft standards and quality guidelines which allow the accredited SKZ - laboratory to perform the following tests:

- Tests according to Quality and Testing Specification issued by Quality Association for Wood-based Panels, registered association to achieve a quality mark for terrace deckings (initial type test and third-party supervision)
- Test methods for characterisation of WPC materials and products according to CEN/TS 15534, parts 1 to 3
- Product characteristics and general test methods for WPC according to Önorm B3031; Önorm B3032

Furthermore, SKZ supports companies in order to create and perform testing programs for building inspection approvals for statically relevant applications. These tests comprise:

- Tests of material properties, e.g. mechanical and thermal properties, resistance tests
- Tests of product properties, such as water absorption, flexural behavior, long-term resistance, thermal behavior, impact, slip, chemical resistance as well as weathering resistance

Sustainability assessment

What do you contribute to a sustainable development of economy, environment and society? SKZ's working group „Sustainability" helps finding answers to these questions. Reliable data are collected and comprehensive analyses are made for your materials, processes and products. Life Cycle Assessments, Environmental Product Declarations (EPD), Carbon Footprints and energy efficiency analyses are issued. Our primary goals: make sustainability measurable and realize optimisations.

Training and knowledge transfer in the field of biomaterials

Professional training and comprehensive knowledge are individual and company key factors for a successful future. In SKZ's training centre professionals and managers are trained a.o. in the fields of WPC. The seminar „Wood Plastic Composites" has been conducted once a year since 2007. The event has a workshop character, i.e. topics are discussed intensively with participants in small groups. Experts discuss markets, raw materials, processing and applications of WPC. The conference „Biopolymers in film applications" has been conducted in collaboration with Innoform coaching since 2008. The aim of the conference is to report about current developments and trends when using biopolymers for film applications.

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9th International Conference of the European Industrial Hemp Association (EIHA)

www.eiha-conference.org

May 23th–24th 2012

Rheinforum, Wesseling/near Cologne (Germany)

Conference language: English

++ Cultivation ++ Processing ++ Economy ++ Sustainability ++ Innovation ++

Pictures: Hempro Int., Lotus Cars, Hemp Technology Ltd, NPSP Composites

Don't miss the biggest industrial hemp event in 2012 – world wide!

The congress will focus on the latest developments concerning hemp and other natural fibres as well as hemp nuts, oil and proteins.

Applications
- Fibres & shives
- Bio-Composites
- Insulation
- Construction
- Textiles
- Hemp nuts, oil and proteins

Spectrum of participants
- Natural fibre industry
- Hemp food and feed industry
- Cultivation consultants
- Engineers
- Traders and investors
- Research and Development

Exhibition

You are welcome to present your latest products, technologies or developments – book a stand and a bulletin board now for only 200 EUR (plus 19% VAT).

Organiser
www.nova-institute.eu

Sponsor
www.hempro.com

In co-operation with EIHA
www.eiha.org

Partner
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www.thehia.org

Media-Partner
www.hempindustryinsider.com

www.bio-based.eu/news

www.bio-based.eu/iBIB

www.hemptrade.ca

Get the programme online:

Many thanks to our partners, who will distribute the iBIB in their networks

www.agrotech.dk (Denmark)

www.belgianbiopackaging.be (Belgium)

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www.bioplasticsmagazine.com (Germany)

www.bioplastiques.org (France)

www.biopreferred.gov (USA)

www.degradable.org.cn (China)

www.bpiworld.org (USA)

www.bioplasticscouncil.org (USA)

www.biomater.com.br (Brazil)

www.ecocomp-conference.com (UK)

www.ecocomposites.net (UK)

www.europabio.org (Belgium)

www.european-bioplastics.org (Germany)

www.iar-pole.com (France)

www.fnr.de (Germany)

www.nia.or.th (Thailand)

www.nnfcc.co.uk (United Kingdom)

www.tbia.or.th/en (Thailand)

www.vhi.de (Germany)

www.wood-kplus.at (Austria)

www.wpc.cn (China)

Many thanks to our media partners:

www.ecocomp-conference.com (United Kingdom)

www.plastech.biz (Poland)

www.plasticker.de (Germany)

www.bio-base.eu/news (Germany)

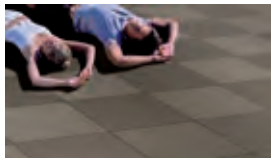
The nova-Institute (www.nova-institut.eu) features decisive innovations in the WPC Industry with its innovation award during congresses. The winners of the years 2007 to 2011 are:

WPC Innovation Award 2007

Awarded at the Second German WPC Congress (www.wpc-kongress.de/wpc07) on the 4th–5th of December 2007 in Cologne. The award was sponsored by the Reifenhäuser GmbH & Co. KG Maschinenfabrik (Troisdorf). www.reifenhauser.com

Category Product

1 **Extruded shelf from WPC with patented compression fittings: mehwerk design labor (Germany).** A very light shelf of wood chambers with typical woodlike appearance and feel.
www.mehrwerkdesignlabor.de



2 **terraZa: SQUARE-SHAPED, DURABLE, PRACTICAL: WERZALIT GmbH + Co. KG. (Germany).** WPC injection molding flooring for outdoor use with a patented click system which can be laid safely and quickly.
www.werzalit.de

3 **Flexible interior composite wood: Wacker Polymer Systems GmbH & Co. KG. (Germany).** The natural wood colour image is preserved due to the low-temperature processing. The bending properties can be adjusted to the range of “stable” to “flexible”.
www.wacker.com

Category Procedure

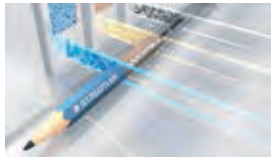
1 **Linear vibration welding for the creation of Fibrex™-links in window-making: Fentech AG (Switzerland).** By the linear motion of two parallel joining areas and the effect of pressure, heat is generated in the joint zone (principle: Rub your hands together). The bonding materials melt. After cooling of the thermoplastic materials, a force-fit connection is created.
www.fentech.ch

2 **Recipe and method of production of WPC from residues of furniture production: Reinü-Fefa Produktions GmbH (Germany).** Milling dust from the cutting MDF-machining is processed into various types of WPC compounds and final products such as decks, panels – technical level of properties similar to talc filled standard plastics.
www.fefa.de

3 **Coloured WPC in a rotary sintering process: PHK-Polymer GmbH (Germany)** The rotary sintering process “Rotowood” can now allow you not only to process hardwood, but also softwood. Different colored wood particles lead to new design possibilities.
www.phk-polymertechnik.de

WPC-Innovation Award 2009

Awarded at the Third German WPC-Congress (www.wpc-kongress.de/wpc2009), December, 2nd–3rd 2009, Cologne, Germany. The innovation award has been sponsored by Reifenhäuser GmbH & Co. KG Maschinenfabrik (Troisdorf, Germany). www.reifenhauser.com



Staedtler Mars & Co. KG: Pencil made of WPC WOPEX® (Wood Pencil Extrusion) (Germany). The WOPEX pencil shaft is made from a wood plastic composite (WOPEX WPC) with a wood content of 70%. The material consists of fine wood fibre from PEFC-certified German saw mill residue. The pencil lead is made up of appropriate graphites with the addition of very brittle plastics and stearates (soaps) instead of the conventional mixture fired from clay and graphite.
Compared to the production of conventional pencils, the production process is much shorter. In addition, the use of wood as a raw material is much more efficient (for conventional pencils the wood waste is up to 80%) and less energy is required. There are also many benefits for customers: the look and feel is of a high-quality, the writing flow of the pen has a waxy glide which leaves almost no particle residue on the page. Furthermore, it lasts almost twice as long as comparable wood-cased pencils.
www.staedtler.de

H. Hiendl GmbH & Co. KG: Profiles made of Hiendl NFC® (Germany). As an alternative to standard metal profiles H. Hiendl GmbH & Co. KG offers a variety of assembly profile systems that are made from the composite material Hiendl NFC® with a wood content of 70%. In comparison to conventional metal systems, the profiles of Hiendl can be continuously extruded in colour.
Because of the high-quality composite material and the greater thickness of the material in comparison to metal profiles, the Hiendl profiles are as robust as conventional solutions. They are compatible with conventional systems and are lower-priced than aluminum profiles.
www.hiendl.de

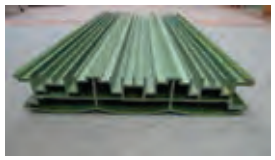
Qingdao HuaSheng Hi-tech Development Co. Ltd, WPC thermal insulated siding (China). WPC-facing elements: Biofibres based on macromecule interfacing by special processing are compounded with plastics (rexycled PP, ABS and PET) to directly extrude this outdoor siding with smooth surface and tenon. Its striking features are its XPS-thermal insulation, its long durability and its water, wind and snow resistance.
www.qdwpc.com

WPC-Innovation Award 2011

Awarded at the Fourth German WPC-Congress (www.wpc-kongress.de/wpc2011), December, 13th–14th 2011, Cologne, Germany. The innovation award has been sponsored by BASF Color Solutions Germany GmbH. www.basf.com

Evonik Industries AG: PLEXIGLAS® Wood PMMA-wood composite (Germany).

Evonik Industries AG has developed a pure PMMA-wood composite in cooperation with Reifenhäuser GmbH & Co. KG. Known for its durability and fibre wetting, PMMA's properties are shown to their full advantage when combined with wood. Thus the new material will take WPCs to a whole new level in terms of weather resistance, colour stability, dimensional stability and technical strength without requiring any additional surface treatment. The first product group to benefit from the new material will be decking that has a specially developed surface structure in various, brilliant colours. Later it will be available as a special WPC moulding compound.
www.evonik.de



Möller GmbH & Co. KG: WPC noise protection profile (Germany/Poland).

Möller GmbH & Co. KG presents the product of a joint project with the Cracow Academy of Mining and Metallurgy, the University of Bydgoszcz and Möller-Polska z.o.o.: a WPC noise protection profile. The WPC profile components are weather- and salt-resistant, and their simple plug-on system with profile widths of up to 6 cm saves costly and energy-intensive on-site assembly work. The inner damping performance of the WPC material has been put to good use and combined with a specially developed surface design that scatters sound. The noise insulation system is suitable for lining busy streets, but it can also be used as sound-absorbent cladding in industrial plants and as sound-absorbent interior wall panelling.
www.moeller-profilsysteme.de

Werzalit GmbH & Co. KG: Process technology for in-mould coating of injection-moulded WPC parts (Germany).

As part of a joint project, the Werzalit GmbH & Co. KG developed a process technology for the single-step, in-mould decoration and backing of genuine wood veneer. Using this method it is possible, for the very first time, to apply a genuine wood veneer to large, 3D heavily warped contours in one single step. The WPC material offers properties such as low shrinking and warping, and the company was able fully to exploit these technological advantages. There is no need to pre-form the veneer parts either. A product using this new processing method – a backrest for an office chair – is currently being prepared for market.
www.werzalit.de

Next: WPC-Innovation Award 2013

Please apply: Lena Scholz, Phone: +49 (0) 2233 48–1448, lena.scholz@nova-institut.de

Biomaterial of the Year 2008

Awarded at the International Congress of Raw Material Shift & Biomaterials on the 3rd–4th December 2008, Cologne. The award was sponsored by the Reifenhäuser GmbH & Co. KG Maschinenfabrik (Troisdorf). www.reifenhauser.com

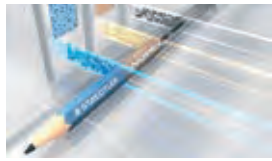
BIO-PEN: 80% natural ballpoint pen. Overall Winner of the "Biomaterial of the Year 2008": FKuR Kunststoff GmbH & Ritter-Pen GmbH (Germany). The Bio-Pen by Ritter-Pen consists of 80% of Biograde®, a transparent celluloseacetat made of European softwood. Biograde® not only enables injection moulding effectively but is also easy to print and colour.
www.fkur.de, www.ritter-pen.de

Wood-free tree Product: Men's shoe in BARKTEX with latex: Bark Club Cloth Europe (Germany/Uganda). Bark cloth BARKTEX _Plus-Latex_059 is a rugged, abrasion-resistant, semi-finished product from the bark of the Ficus natalensis ("bark-cloth"), moistened with natural latex of the rubber tree Hevea brasiliensis.
www.barktex.com

NABASCO Natural Fiber Composite for sanitary units: NPSP Composieten BV (The Netherlands). Nabasco (Nature Based Composite) is made from natural fibers such as hemp, flax or sisal with thermosets such as polyester or epoxy resin in the RTM process. Reinforced Bio-resins are to be used in the future. Apart from sinks, the material is used invarious outdoor applications.
www.npsp.nl

Biomaterial of the Year 2009

Awarded at the Biomaterials Congress on the 26th–27th of October 2009 in Stuttgart (at the AVK Annual Meeting): www.biowerkstoff-kongress.de. The award was sponsored by the machine manufacturer Coperion GmbH (Stuttgart). www.coperion.com



WOPEX® – WPC-pencil: Staedtler Mars GmbH & Co. KG. (Germany). The pencil shaft is made from a wood-polymer composite (WPC WOPEX) with a wood content of 70%, which is extruded in a coextrusion together with the graphite core and the tactile soft surfaces. The WPC-pencil also has an increased functionality along with energy and raw materials saving.
www.staedtler.de

BIOSHRINK® – compostable shrink film: alesco GmbH & Co. KG. (Germany). BIOSHRINK is the world's first compostable shrink film made from renewable raw materials. BIOSHRINK enabled a reliable shrinkage behaviour.
www.alesco.net

Kraftplex® – Wood panel: Well Exhibition Systems GmbH (Germany). The versatile material Kraftplex consists of pure wood fiber, but also holds the characteristics of metal, composites, and plastics. It is stable, flexible and permanently malleable like metal sheets.
www.well.de

Biomaterial of the Year 2009

Tereos-Syral – MERIPLAST: a rubber type protein-based Bioplastic (France/Belgium). Meriplast is a particular new bioplastic: An elastomer made from wheat protein with new completely biodegradable material properties.
www.syral.com

Special Award for R&D

Biomaterial of the Year 2010

Awarded at the International Congress on bio-based Plastics and Composites on the 20th–21st April 2010 at Hannover, Germany: www.biowerkstoff-kongress.de. The award was sponsored by the compounding system manufacturer Coperion GmbH (Stuttgart, Germany). www.coperion.com

PROGANIC® – Watering Can: Proper GmbH & Co. KG (Germany). The 100% natural material PROGANIC® is based on three main ingredients: Polyhydroxyalkanoate (PHA), Carnauba Wax and a natural mineral filler. Polyhydroxyalkanoate (PHA) is a biopolymer that is made from bacteria. It can break down naturally and be digested by micro-organisms and is therefore biodegradable. PHA has the same qualities as plastic but it uses renewable raw material such as sugar from crops instead of finite natural resources.
www.proganic.de

GreenGran Natural Fibre Reinforced Granules for Injection Moulding – Bio-Charger: GreenGran B.V. (The Netherlands/ China). Using sustainable and renewable natural plant fibres (such as flax, jute, hemp and kenaf) and through industrial production techniques that mix them into plastics; GreenGran's granules are made from a combination of these natural fibres with polypropylene, thus reducing the use of petroleum products. Five times stiffer and 2.5 times stronger than polypropylene, they will not wear and tear the screw and the mould as glass fibres do. Unlike glass fibres, they do not pose safety and health risks and generally show a better energy and CO_2-balance.
www.greengran.com

Arctic (based on PLA) – ECOmfort Correction Roller: Henkel AG & Co. KGaA (Germany). The newly developed and innovative natural 'Arctic' material sets new standards by replacing a highly technical performance plastic with a sustainable renewable material. The new Pritt ECOmfort is the first Correction Roller in the world made from approx. 89% natural plastic (device shells, excluding usable material such as correction tape & inner parts). This results in approximately 60% less CO_2 emissions, compared to a roller made from standard plastic, in terms of the whole lifecycle from production (incl. transportation) until waste disposal (same method e.g. recycling).
www.henkel.de

Biomaterial of the Year 2011

Awarded at the International Congress on bio-based Plastics and Composites on the 15th–16th March 2011 at Cologne, Germany: www.biowerkstoff-kongress.de. The award was sponsored by the compounding system manufacturer Coperion GmbH (Stuttgart, Germany). www.coperion.com

OMODO® GmbH - Zelfo® (Germany). The „Cellulose Optimization Resource Efficient (CORE)"-technology up-cycles cellulosic and ligno-cellulosic waste without the addition of any chemicals, catalysts or binders to create Zelfo®, a micro and nano-fibrillated cellulose fibre (MFC/NFC). Zelfo® can be formed into finished objects (bio-composites), or used as a bio-additive to improve plastic or paper material characteristics.
Biomass: Cellulose and ligno-cellulose biomass
www.omodo.org
www.zelfo-technology.com

Ecovative Design LLC - EcoCradle™ (USA). EcoCradle is a low embodied-energy, compostable, protective packaging material that is literally grown into any custom shape and competes with petrochemical foams in terms of both performance and cost. The self-assembling bonds formed by mycelium (mushroom "roots") produce this material as it grows around a substrate of regionally sourced agricultural byproducts.
Biomass: Agricultural byproducts, fungus mycelium
www.ecovativedesign.com

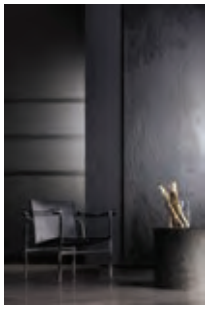
ROQUETTE - GAÏALENE® (France). GAÏALENE® is a new „high-performance" range of bio-based plastics for packaging, which can compete in performance terms (mechanical, thermal, soft touch, etc.) with fossil-based plastics. GAÏALENE® resin is for lasting applications that usually use polyolefins, ABS and more technical polymers - with an excellent cost/efficiency profile.
www.gaialene.com

Biomaterial of the Year 2012

Awarded at the International Congress on bio-based Plastics and Composites on the 14th–15th March 2012 at Cologne, Germany: www.biowerkstoff-kongress.de. The award was sponsored by the compounding system manufacturer Coperion GmbH (Stuttgart, Germany). www.coperion.com

NAPORO GmbH – Fibre mouldings made from cattail (Typha) (Germany). Robert Schwemmer, Managing Director of NAPORO GmbH from Braunau am Inn in Austria, gave an enthusiastic presentation that won over the expert audience. Naporo manufactures low-density fibre mouldings for various uses from the little-used cattail (Typha). The binding process works through the NAPORO 'NATglue' technology, whereby waxes and oils derived from the marsh plant are activated as binding agent. Cattail (Typha) is a wild plant that grows to heights of up to 4 metres, forms large, highly resistant clumps in wetlands and can be managed sustainably. NAPORO foresees that this new kind of fibre moulding will be used in the building and furniture industries, aswell as for housings and later in the automobile industry. The first products have already been launched onto the market.
www.naporo.com

Martin Fuchs Spielwaren GmbH & Co. KG – 'spielstabil bioline' toy range made from modified PLA (Germany). Second prize went to the company Martin Fuchs Spielwaren GmbH & Co. KG from Zimdorf with their children's toys made from modified PLA. This new development was presented by Martin Vollet (Martin Fuchs Spielwaren) and Cord Grashorn (Linotech). The basis for the new 'spielstabil bioline' toy range was the newly developed PLA Compound Naturegran PV 6930, 68% of which is derived from renewable resources. The toys have very high material strength and high impact strength. The expert audience was obviously impressed by this joint development between the companies Martin Fuchs Spielwaren, Livemold (injection moulding) and Linotech (developer of the material) and by the many challenges the new material was able to meet in terms of its technical characteristics, the high proportion of biomass, intensive colouring and numerous cases where it was approved for toys. Product recycling was also taken into account: customers can return the new toy to the manufacturer at no cost later for the materials to be recycled.
www.martin-fuchs-spielwaren.de



Resopal GmbH – RE-Y-Stone made from recycled paper with bagasse resin (Germany). Tanja Schäfer was delighted with third place for Resopal's new RE-Y-Stone material. Basic and decorative paper is bound with a natural resin made from the residues of sugar production (bagasse) to make 'RE-Y-STONE'. After curing, the bio-resin has thermoplastic properties and together with the papers forms a hard, mechanically highly loadable, dimensionally stable sheet with a robust surface. The bio-composite sheet is made entirely from renewable and recycled raw materials. One particularly impressive feature of the product is that the surface can be custom designed to make the material look like slate or wood.
It is mainly used in the construction industry (interior fittings) or for furniture. The new material can even be used for interior floors.
www.resopal.de

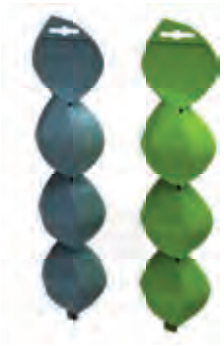
SusPack 2012 - Conference on sustainable packaging (www.suspack.eu)

During this common event with Anuga FoodTec (www.anugafoodtec.de), for the first time the nova-Institute offered the „SusPack Award" for the most innovative and sustainable packaging solution which have had a market launch in 2011/2012.

SusPack Award 2012

Constantia Flexibles GmbH – Paperlid – A more sustainable yoghurt pot lid (Austria). The Paperlid developed by Constantia Flexibles is a three-ply, aluminium-free punched card containing a high proportion of FSC-certified paper. The heat seal lacquer makes it possible to apply a peel-off seal to standard PS and PP pots as well as PLA pots. Paperlid's striking features are its far smaller carbon footprint than conventional aluminium or plastic lids and its pleasant and the ability to work on standard production lines. It also has high barrier performance, good printability and papery feel leads to an appealing papery touch and look. The product proved a hit with the expert audience.
www.constantia-flexibles.com

tipa-corp ltd – Tipack – Nature will not even notice we were here (Israel). TIPA has developed revolutionary patent-pending biodegradable blends for production of packaging solutions for liquids and food. TIPA's flexible pouches are cost competitive, as production processes are optimized for using less raw materials and less heat-energy consumption. With Tipack, a 1-liter 4-pack with varying beverage content per pouch, it has developed a unique family pack ideal for outdoor activities.
www.tipa-corp.com



Imperial Ventures b.v. – abulbc – Dutch Tulips in Dutch Design - biodegradable packaging (The Netherlands). Imperial Ventures has developed packaging for tulip bulbs that makes full use of the possibilities offered by bio-based and biodegradable plastics as well as having an attractive design. This makes it easy to present homogeneous and clean batches of bulbs for sale, as well as allowing bulbs to be planted in their packaging. The packaging decomposes in the soil, ensuring it does not impede the plant's growth.
www.abulbc.nl

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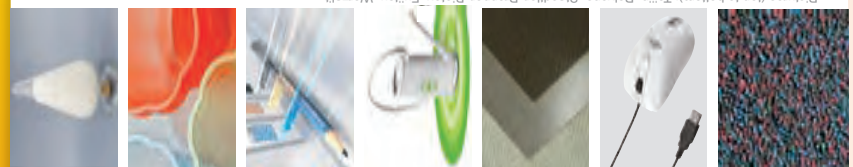

Pictures (top to bottom): Teijin, Polyone, Steadtler, Propper, Biotex, Fujitsu, Werzalit

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www.CO2-chemistry.eu

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ISBN 978-3-9812027-5-5