PRESS RELEASE

10 WINNERS CELEBRATED AT THE NEXT JEC INNOVATION AWARDS DURING JEC AMERICAS 2016 - GEORGIA WORLD CONGRESS CENTER, ATLANTA– MAY 3-5, 2016

In its mission to find and promote the most advanced Composites Innovations in the globe, JEC Group reveals the 10 winners of JEC Innovation Awards – Atlanta 2016.

ATLANTA, March 29, 2016 - JEC Group, the world's largest organization exclusively dedicated to the composites industry, has announced the ten winners of its prestigious 2016 JEC Americas Innovation Awards program. The ceremony will take place during the 5th annual JEC Americas Composites Show and Conferences at the Georgia World Congress Center in Atlanta.

"The American market has traditionally been pioneer in the composites industry both in terms of manufacturing and innovation. The US is a strategic geography for the global composites market as it represents around a third of its value" said Mrs. Frédérique Mutel, JEC Group President and CEO. "*The JEC Innovation Awards Program reflects these observations that are also crossmatched by the variety of applications we received from America, Asia, Europe and even Oceania"* Nicolas Baudry, JEC Americas Director adds.
For this year's award's program, winners in categories such Design, Testing, Biocomposites, Aeronautics, Transportation, Automotive, E-Mobility, Process and Sports & Leisure will be celebrated.

The JEC Innovation Awards ceremony will highlight 10 innovators and will take place on May 4 at 4:15 pm at the Georgia World Congress Center in Atlanta

All exhibitors, visitors and journalists are welcome to attend the ceremony.

The JEC Innovation Awards Program is supported by JEC Composites Magazine and Aviation Week.

www.jeccomposites.com

About JEC Group
With a network of 250,000 professionals, JEC Group is the largest composite organization in the world. It represents, promotes and helps develop composite markets by providing global and local networking and information services. For the past 20 years, JEC has achieved continuous growth and acquired an international reputation. It has opened offices in North America and Asia. The Company is entirely owned by the non-profit Center for the Promotion of Composites. JEC Group's policy is to systematically invest its profits in the creation of new services to benefit the industry. After successfully winning over the composites industry, JEC Group is now enlarging its scope to the next segment of the value chain, i.e. manufacturers and end-users.
Through Knowledge and Networking, JEC's experts offer a comprehensive service package: the JEC publications - including strategic studies, technical books and the JEC Composites Magazine - the weekly international e-letter World Market News and the French e-letter JEC Info Composites. JEC also organizes the JEC World Show in Paris – the world's largest composites show, five times bigger than any other composites exhibition -, JEC Asia in Singapore and JEC Americas in Atlanta; the Web Hub www.jeccomposites.com; the JEC Composites Conferences, Forums and Workshops in Paris, Singapore and Atlanta and the JEC Innovation Awards program (Europe, Asia, America, India and China).
The composite industry employs 550,000 professionals worldwide, generating 61 billion euros worth of business in 2015.

Global press Contact- JEC GROUP - Thierry-Alain TRUONG - Tél. : +33 (0)1 58 36 43 98 E-mail : truong@jeccomposites.com

10 CHAMPIONS OF COMPOSITES MATERIALS RECEIVING A JEC INNOVATION AWARD

AERONAUTICS – ThermoPlastic Composites Research Center (The Netherlands)
Green PPS leading edge cover made from recycled thermoplastic composite materials

TRANSPORTATION – Omni Tanker Holdings (Australia)
Carbon fiber composite transport tanks combining lightweight properties with very high chemical resistance

AUTOMOTIVE – Magna Exteriors (USA)
Molding process making use of two sided steel compression

DESIGN – FlexSys Inc. (USA)
Compliant design technology and software for product designers of the future

PROCESS – Fraunhofer Institute for Production Technology (IPT) (Germany)
Manufacturing and processing of tailored thermoplastic composite blanks

TESTING – CETIM (France)
"Continuous Peel Test Equipment": optimizing the tape winding process of thermoplastic composites

BIOCOMPOSITES – Genome Prairie (Canada)
Next-generation biocomposite materials: How the science of genomics can revolutionize the automotive sector

E-MOBILITY – Institute of Lightweight Engineering and Polymer Technology, TU Dresden (Germany)
Innovative design for thermoplastic support frame structures: Implementation of function-integrative hollow structures

SPORTS & LEISURE – Cross Composite AG (Switzerland) & **C8 Sports** (Switzerland)
Automated production system for 3D complex, fully recyclable bicycle components

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Category: AERONAUTICS

Winner: ThermoPlastic Composites Research Center (The Netherlands)

Partners: Fokker Aerostructures B.V. (The Netherlands), TenCate Advanced Composites B.V. (The Netherlands)

Name of Product or Process: **Green PPS leading edge cover made from recycled thermoplastic composite materials**

Description:

The innovation is a green PPS leading edge cover made from recycled thermoplastic composite materials. The project encompasses the recycling of scrap material generated during the manufacture of thermoplastic composite parts. For example, scrap is produced when manufacturing a rudder, elevator or wing part using thermoplastic prepregs and an autoclave process. The scrap can be re-used by cutting the material to flakes of +/- 10 mm × 10 mm and subsequently applying a compression molding process to form a complex structural part. In a closed recycling process, this part can be used in the same structure as for which the scrap was generated, such as (for example) an edge cover in the aforementioned rudder, as is demonstrated with the current innovation.

The demonstrator was built using experimentally validated design rules, taking into account the complicated flow behaviour of the flake material and the stochastic nature of the mechanical properties.
The use of thermoplastic composites reduces manufacturing costs and part weight. The recycling potential of thermoplastic composites is clearly demonstrated with this innovation, which is an important step in the cost optimization of composite design and manufacture.
The market potential is very large in areas where thermoplastic composites are already used. As demonstrated, the prepreg scrap generated during the production of large thermoplastic composite structures can be well used for (small) complicated parts attached to that structure. Moreover, the use of thermoplastic flakes (moulding compound) was demonstrated in other projects as a promising material for structural, geometrically complex structures such as aircraft window frames. This innovation provides theoretical tools in the form of processing and design guidelines to further enhance the application of thermoplastic moulding compounds.
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Global press Contact- JEC GROUP - Thierry-Alain TRUONG - Tél. : +33 (0)1 58 36 43 98 E-mail : truong@jeccomposites.com

Category: TRANSPORTATION

Winner: Omni Tanker Holdings (Australia)

Partner: GreenStorm Solutions (Australia)

Name of Product or Process: **Carbon fiber composite transport tanks combining lightweight properties with very high chemical resistance**

Description:

The Omni Tanker A and AB tanks are composite tanks that combine lightweight qualities with very high chemical resistance, at a good selling price. The tanks are particularly light and strong, with a mass of approximately half that of a steel tanker with equivalent volume. The benefits of a lightweight tank are numerous: fuel savings and reduced emissions associated with transport, and more importantly, an increased payload that can be shipped in a single transport run of a tanker.

What's more, the tanks have excellent chemical resistance. Compared to tanks with standard liners, Omni Tanker A and AB tanks are more durable (longer service life) with lower maintenance costs, and ensuring higher chemical purity at destination. The tanks allow a broader range of use and flexibility, far exceeding that of tanks with standard liners, because they can be washed out very effectively. This means that they can be backloaded with different chemicals, and that the chemical being transported can be changed based on seasonal demand. The lightweight, chemical-resistant composite tanks are available to customers at a competitive price, offering larger payloads, reduced fuel costs, reduced transport emissions and high-purity quality of the shipped product, thereby increasing company profits. The result is a product that has captured the Class 8 corrosive dangerous goods transport market in Australia, and is now subject to high demand from transport operators in the European market.

Global press Contact- JEC GROUP - Thierry-Alain TRUONG - Tél. : +33 (0)1 58 36 43 98 E-mail : truong@jeccomposites.com

Category: AUTOMOTIVE

Winner: Magna Exteriors (USA)

Partners: Barrday Composite Solutions (Canada), Century Tool & Gage Co. (USA), Polycon Industries (Canada)

Name of Product or Process: **A moulding process that utilizes two-sided steel compression**

Description:

Magna Exteriors has developed a moulding process based on two-sided steel compression. A proprietary, fast-cure, high-Tg carbon fibre prepreg using industrial-grade fibres was thus developed. Parts are therefore suitable for Class A applications.
The high-Tg formulations allow the material to withstand heat from harsh environments. The Tg also allows the parts to be processed at the higher temperatures (125°C) typically seen in North American paint shops, compared to the typical European paint shop temperatures (81°C).
Primary tooling was supplied by Century Tool & Gage Co. of Fenton, Michigan. A modified tool design, based loosely on conventional shear edge compression tools, was also used. Modifications based on Fibersim analyses were incorporated. Prepreg sheets are cut to a 2D shape and then preformed, using a proprietary end-of-arm tool concept to achieve approximately 80% of the final 3D shape.

With a cycle time measured in minutes vs. conventional autoclave technology where cycle time is in hours or days, the process allows for higher volume serial production, a factor to be considered in the automotive sector.

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Category: DESIGN

Winner: FlexSys Inc. (USA)

Name of Product or Process: **Compliant design technology and software for product designers of the future**

Description: By using compliant design expertise and methods, FlexSys was able to design a single-piece wiper arm and blade that costs less and both outlasts and outperforms traditional metal assemblies. A composite thermoplastic of 30%-glass-filled PBT was determined to have the required properties and characteristics to meet the demands and provide the necessary strength/stiffness ratio. The single-piece moulded design eliminates 11 parts along with the associated assembly, weighs half as much, and costs only 1/3 as much as the legacy design.

Unlike the traditional hinged blade, this wiper provides constant spring pressure to the blade through each of its arms. However, the difficulty in development was that current 3D modelling programs were not up to the task, as they design using rigid members and linkages. In compliant design, the elasticity of materials must be embraced and used to create motion. To surmount this obstacle, FlexSys is developing unique software called FlexWorks, with the help of a grant from the National Science Foundation. This software allows the input of desired motions and magnitudes, and will run through thousands of iterations to find one to most closely fit the given criteria. It considers the maximum stress/strain capability of the material in each iteration so as not to exceed it. The output provides the required thickness variation throughout each bending member. It will also show the new compliant mechanism in motion, bending, and displaying a stress analysis. The final design can be changed in the edit mode and re-evaluated, then saved in a file to 3D print or import to Solidworks, Ansys, etc. FlexSys believes the software could eventually become a module available in 3D modelling programs. The first ever public view and alpha release of the software will be available in the JEC Atlanta demo zone.

The advancement of composite injection moulding materials will fuel the future of compliant structures. Additives such as carbon fibres and nanotechnologies can increase the strength/flexibility ratio, allowing for higher load applications with greater fatigue-free travel. More compliant design concepts can be seen in the demo zone, including applications in the automotive, medical, robotics and prosthetics fields.

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Category: PROCESS

Winner: Fraunhofer Institute for Production Technology (IPT) (Germany)

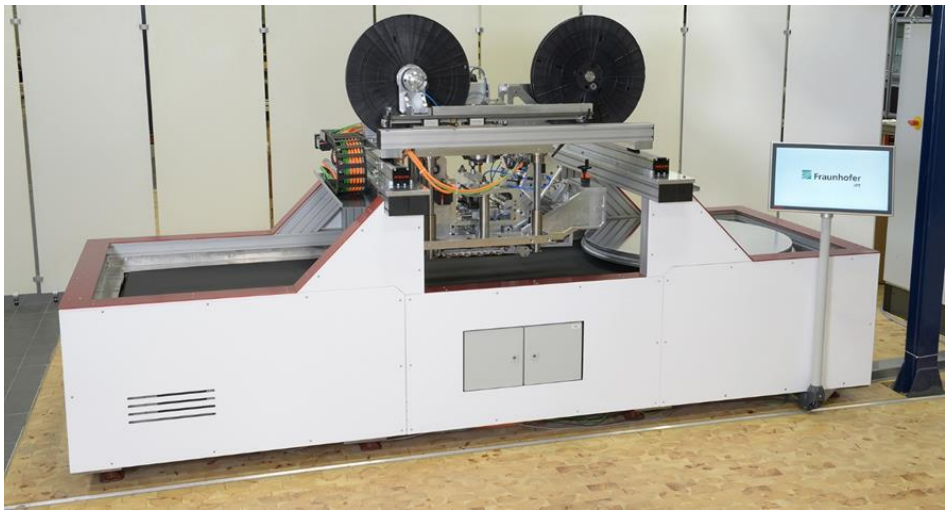
Partners: HBW-Gubesch Thermoforming GmbH (Germany), Bond Laminates GmbH (Germany)

Name of Product or Process: **Manufacturing and processing of tailored thermoplastic composite blanks**

Description: Fully consolidated thermoplastic composite blanks are often used for high-volume composite applications such as consumer goods (e.g. mobile phone cases) and automotive parts (e.g. seat structures) but also for semi-structural applications in aerospace (e.g. clips, J-nose, etc.). They offer high weight-saving potential in combination with good and easy processability. Furthermore, they can be manufactured continuously and have an infinite shelf life, so they offer some major economic advantages as well. However, these blanks are standard products, so they are not tailored for a specific application. This means that the blanks come in a uniform thickness and that the fibre orientation is constant. The composite innovation, consisting of a technology for the manufacturing and processing of tailored thermoplastic composite blanks, overcomes these issues.

Reinforced unidirectional thermoplastic tapes, which offer very high performance in the fibre direction, can be used to produce thermoplastic composite blanks that are optimized for the application. This also greatly reduces waste during production. With the support of Bond Laminates, Fraunhofer IPT has developed a production system that combines the advantages of continuous double belt presses and flexible tape placement systems: high volume production and tailored plybooks at highly competitive production costs. Furthermore, in contrast to existing solutions, this system allows the direct consolidation of thermoplastic composites during lay-up (so called “in-situ consolidation”), thereby avoiding the usually required post-consolidation step and dramatically increasing energy efficiency. HBW Gubesch has developed both the simulation tools and the forming processes to enable the easy processing of these advanced tailored composite blanks.

The key benefit of the innovation is the netshape and load-optimized production of tailored thermoplastic composite blanks. The resulting materials are optimized lightweight structures where the fibre orientation and thickness perfectly match the application. Furthermore, material use and cost are reduced, as the material is only applied where needed (selective reinforcement).



Global press Contact- JEC GROUP - Thierry-Alain TRUONG - Tél. : +33 (0)1 58 36 43 98 E-mail : truong@jeccomposites.com

Category: TESTING

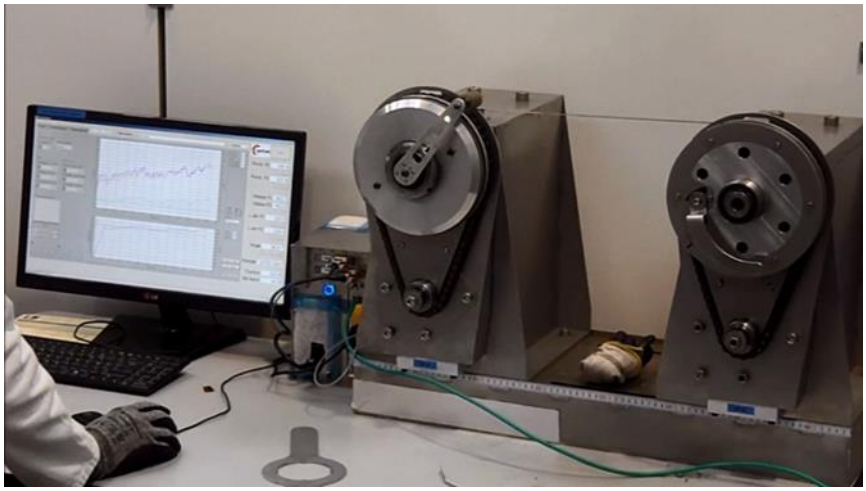
Winner: CETIM (France)

Partner: LF Technologies (France)

Name of Product or Process: **"Continuous Peel Test Equipment": optimizing the tape winding process of thermoplastic composites**

Description: The "Continuous Peel Test Equipment" has been invented by CETIM to optimize the tape winding process of thermoplastic composite structures. The laser assisted tape winding process is a growing technology, offering a promising productivity. The development of a tape winding technology involves the full value chain: raw material manufacturers, winding machine builders, process developers, and composite structures manufacturers. All of these contributors are aware that the key of process optimization is to know the limits of the process window. In tape winding or tape placement, time constants are so short that it is almost impossible to measure precisely the physical values involved (pressure, temperature, heat transfer). Therefore, a huge amount of trials is required to define the acceptable level of tape quality (surface roughness, variation of impregnation), the acceptable process parameters and the acceptable performance of the final structure. Facing this variety of input data and parameters, a classical optimization method would be very expensive in mechanical tests and material controls. Thus, a method has been developed by CETIM to save cost during the optimization phase. This method is based on a continuous peel-test machine. The samples used in continuous peel test are rings directly processed on the winding machine, without specific preparation. The rings are then mounted on the peel test equipment, measuring continuously the peel energy of the bonding. A variation of peel energy can be detected and correlated with a variation of tape quality or a variation of process parameters.

This testing equipment is able to evaluate peel energy of thermoplastic composites very efficiently. Because this equipment can be installed directly inside the production workshop, it is possible to produce and test a ring in 5 minutes. On the other hand, classical peel test method must be performed in laboratory, and, from the time you send the test samples, it takes generally a few days before receiving the test report. Time saving is not the only benefit: the cost of the single peel test is divided by a factor of 10 if we compare to classical test methods.



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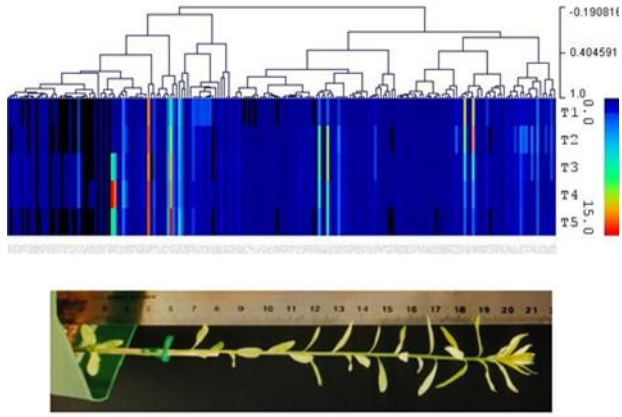
Category: BIOCOMPOSITES

Winner: Genome Prairie (Canada)

Partners: University of British Columbia (Canada), The Composites Innovation Centre (Canada), University of Manitoba (Canada), Westward Industries Ltd. (Canada)

Name of Product or Process: **Next-generation biocomposite materials: How the science of genomics can revolutionize the automotive sector**

Description:



A project under way in Western Canada will soon deliver fully renewable biocomposite materials to the Canadian industry. The materials are based on fibre from flax germplasm with traits genetically optimized for use in advanced composite materials. The project is being carried out with partners from the University of British Columbia and Genome Prairie, and is using semi-structural components of a prototype bio-vehicle (developed with two industrial partners in Manitoba) as proof-of-concept of the approach. Current practices for manufacturing biocomposite materials depend on mixing percentages of natural fibre with fibreglass in appropriate laminate structures and using petroleum-based resins as a binding matrix. However, fibre feedstocks from flax and other crops have not been phenotypically screened and catalogued for their use in specific biocomposite applications. Issues of the greatest industrial relevance are: i) the lack of uniformity of fibres leading to inconsistent product performance; ii) poor adhesion of fibres to petroleum-based resins (binding matrix) leading to poor material strength; & iii) the absence of natural resins that provide the required optimum binding capacity, thermostability, and biodegradability (related to ii).

Elite germplasm of flax varieties with traits suited for use in advanced biocomposite products have been created to address these problems. Through previous projects in Canada that applied flax genomics (TUFGEN/FIBRAGEN projects), a collection of straw and water-retted flax fibre from novel, non-transgenic flax genotypes of re-sequenced ethyl methanesulphonate (EMS) mutants and from non-mutagenized varieties has been built at the University of British Columbia. These elite varieties were collected based on knowledge of fibre-related genes generated by gene expression and mapping studies within the TUFGEN and FIBRAGEN projects. In the next phase of the project, a novel microbial polymer/resin will be produced to exhibit complementary physical and chemical properties required for binding to the optimized flax fibres in the biocomposite materials.

This project, therefore, is developing a new generation of genetically optimized biocomposites for industrial utility.

Global press Contact- JEC GROUP - Thierry-Alain TRUONG - Tél. : +33 (0)1 58 36 43 98 E-mail : truong@jeccomposites.com

Category: E-MOBILITY

Winner: Institute of Lightweight Engineering and Polymer Technology, TU Dresden (Germany)

Partners: Rehau AG + Co (Germany), Storck Bicycle GmbH (Germany)

Name of Product or Process: **Innovative design for thermoplastic support frame structures: Implementation of function-integrative hollow structures**

Description:

As part of the TherMobility research project – sponsored by the German Federal Ministry for Economic Affairs and Energy (BMWi) – the project partners Rehau, Storck Bicycle and the Institute of Lightweight Engineering and Polymer Technology (ILK), TU Dresden, developed an innovative design for thermoplastic support frame structures. The frames can be manufactured in a highly automated, integrative injection-compression moulding process integrating local carbon fibre reinforcements.

The technological implementation of function-integrative thermoplastic hollow structures offers high potential for various applications. Novel manufacturing processes for hollow structures made of two functionalized half shells were tested on a minibike demonstrator structure. The aim of the project was to investigate and create a continuous process chain beginning with the production of function-integrated shell structures up to the joined and painted hollow structure. To keep production costs low and still be able to reproduce the components at a consistently high quality, both a high degree of automation and industrial-production-compatible manufacturing processes were factored into this concept.
The load-adjusted use of textile reinforcements in this combined injection-compression moulding process offers considerable potential in many fields. The project involved developing and characterizing compatible textile thermoplastic sheets. Using the same thermoplastic matrix for both the sheets and the granulate made it possible to reach the targeted high-quality standards. The processing technology used in the project offers a wide range of forms, thereby constituting an ideal method to build functionalized, highly integrative structures. The concept of a shell structure consisting of two highly functionalized parts generates particularly significant benefits in comparison to similar structures. These structures can be used in multiple vehicle classes for electric mobility with various load requirements

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Category: SPORTS & LEISURE

Winners : Cross Composite AG (Switzerland) & C8 Sports (Switzerland)

Partners: Institute of Polymer Engineering FHNW IKT (Switzerland), Toho Tenax (Germany)

Name of Product or Process: **Automated production system for 3D complex, fully recyclable bicycle components**

Description:

Cross Composite developed a new material along with a suitable automated manufacturing technique to produce complex, precise load introduction elements that are fully recyclable, for use in outdoor sport applications. Unlike most advanced composite parts, which are derived from a layered structure and therefore are limited in geometry, the products from Cross Composite are based on highly complex load-bearing components. Their production is fully automated and the parts require no post-processing such as machining, since all the products are net-shape moulded. For the first time ever, carbon composite bicycle components are fully recyclable. After five years of R&D, the epoxy resin commonly used to bind carbon fibres together was replaced by an aerospace-certified thermoplastic resin. These products are best-in-class in terms of weight and are tested according to the safety requirements and test methods of European standards. For recycling purposes, the classic shredding technique was replaced by electrical fragmentation to avoid machinery wear and the production of unwanted carbon powder. Furthermore, by collecting the products, Cross Composite can certify a full cradle-to-cradle recycling loop. To date, Cross Composite has developed a 69g saddle, a 105g crank and a 90g stem, all of which are made of 100% thermoplastic composite (including the threads). No metallic inserts are needed, thus enhancing the recyclability of the products and fully respecting eco-design guidelines, as well as being compliant with the new European Waste Framework Directives expected in 2020. In 2020, products without sufficiently proven recyclability may be impacted by eco-taxes, such as what was established in the electronics industry.

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