CAMX

THE COMPOSITES AND ADVANCED MATERIALS EXPO

2017 CAMX AWARD ENTRANTS

AWARD ANNOUNCEMENT – CAMX GENERAL SESSION

OCCC –VALENCIA BALLROOM
TUESDAY, SEPTEMBER 12
8:30 AM – 9:45 AM

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CAMX
THE COMPOSITES AND ADVANCED MATERIALS EXPO

The flagship CAMX Award recognizes innovations that have the potential to significantly impact composites and advanced materials in the marketplace. The CAMX Award will be awarded to two game changing entries that reflect the depth and breadth of the CAMX theme:

COMBINED STRENGTH. UNSURPASSED INNOVATION.

Being recognized with a CAMX Award is one of the highest accolades an innovation can receive. The companies that have advanced as finalists join an elite group of leaders and visionaries within the composites and advanced materials community. CAMX thanks all the 2017 Entrants!

Visit the CAMX Awards Pavilion in the Exhibit Hall during CAMX to see all the Finalists on Display.

COMBINED STRENGTH AWARD

This award is presented to the composites product that clearly demonstrates a team approach and effort that brings together knowledge, resources, and talent to produce an incredible example of the best use of composites materials that solves a problem.

9 Meter Wind Turbine Blade Advanced Technology Demonstrator

FINALIST

IACMI - The Composites Institute

The Institute for Advanced Composites Manufacturing Innovation, IACMI, a Manufacturing USA institute driven by the University of Tennessee, Knoxville and the U.S. Department of Energy, led a team of industry and government partners to fabricate an advanced technology wind turbine blade. The 9 meter long blade was fabricated at the Composites Manufacturing Education and Technology (CoMET) facility, located at the National Wind Technology Center (NWTC), part of the National Renewable Energy Laboratory (NREL). Eleven industrial partners, including Arkema Inc., Johns Manville, TPI Composites Inc., Huntsman Polyurethanes, Strongwell Corporation, DowAksa USA, Chomarat USA, Composites One, SikaAxson, Creative Foam and Chemtrend, provided materials and on-site fabrication support for blade component manufacturing and assembly. Pultruded spar caps were fabricated at Strongwell in Bristol, Virginia and shipped to the NWTC for incorporation into the blade shells. The project was led by the Wind Technology Area of IACMI, based at the NWTC, with support from IACMI, Oak Ridge National Laboratory (ORNL), DOE, and the Colorado Office of Economic Trade and Development (OEDIT). The prototype blade is based on existing designs from previous work conducted by DOE, representing a small-scale version of a utility-scale multi-megawatt blade. The new blade, molded on tooling supplied by TPI Composites, Inc., features blade shells and shear web infused with Arkema's novel Elium® reactive thermoplastic resin system, specialty thermoplastic-compatible glass fiber and sizing developed by Johns Manville for high interfacial adhesion to the Elium® resin system, pultruded carbon fiber spar caps using Huntsman's RIMLINE® toughened polyurethane resin chemistry, in combination with a blend of commercial carbon fiber provided by Dow Aksa and low cost textile PAN-based carbon fiber produced at the Carbon Fiber Technology Facility at ORNL, and shear web and outboard shells produced with ArmaFORM® PET GR structural foam, supplied by Creative Foam, and made from 100% post-consumer PET.

CFRTP Processing Technology Using Commingling, Fiber Laying, and Light Molding

Gifu University

This is a high performance, high fabrication yield, easy molding system for CFRTP moldings of wide use. This system is especially effective for productions of many models in small quantities such as aerospace, mobile, EEE, wear, and sports gear. Here we made a simulated drone-propeller. High strength and low water uptake polyamide, LEXTER (Mitsubishi Gas Chemical), was spun and suitable form fiber for commingling was obtained. The resin fiber was highly dispersed into a carbon fiber yarn by Kajirene commingling technique. The surface of the commingled yarn was treated specially for the convenience of following processes without losing their textile working ability. The commingled yarn was appropriately embroidered on a polyamide film by using Tajima Embroidery Machine. The direction of carbon fiber was exactly controlled by this system. Furthermore, as an embroidering process emits few loss of production, material costs can be saved. At the end of the line, the well-placed preform was cured by D-MEC Amolsys system. Any characteristic molds are simply made by 3-D printer. The preform was put into a mold, and then, vacuumed and heated over its resin melting temperature. Using microwave or near-infrared light, the preform was rapidly heated and started impregnating. As resin fibers and carbon fibers were mixed well in a commingled yarn, it is enough to form a fine molded article even under atmospheric pressure. After cooling, the objective was obtained.This project has started in a collaborative research between Nakai Lab Gifu-University and Mitsubishi Engineering Plastics, and now, it has completed by the united cooperation of Kajirene, Tajima Industries, D-MEC, and Mitsubishi Gas Chemical, in addition to Nakai Lab and Mitsubishi Engineering Plastics. The cooperation enabled the development of the regions between each process.

Composite Overwrapped Pressure Vessel made with Recycled Continuous Carbon Fiber

Vartega Inc

Continuous carbon fiber scrap is generated during the filament winding process used to manufacture composite overwrapped pressure vessels (COPV). This scrap, which is due to defects, trim scrap, spool ends, and expired material, is typically cured and landfilled. Steelhead Composites has partnered with Vartega and Michelman to recycle this scrap for reuse in a new Type 3 composite pressure vessel. Steelhead Composites provides their carbon fiber towpreg scrap to Vartega for recycling. Vartega utilizes its patent pending chemistry-based process to remove the resin and sizing chemistry to produce recycled continuous carbon fiber tow with optimal surface properties. Vartega's recycled carbon fiber has the same tensile strength and modulus as virgin carbon fiber. Once recycled, Vartega provides continuous tow to Michelman for the application of end use specific sizing chemistry. Michelman's Hydrosize® film forming dispersions further optimize the surface chemistry of Vartega's recycled carbon fiber for improved handling and interface adhesion. Recycled and sized continuous carbon fiber tow is then returned to Steelhead Composites for incorporation into new pressure vessels and to close the loop on their manufacturing scrap. Steelhead Composites' MicroForce diaphragm accumulators are a family of lightweight, 3,000+ psi (207 bar) accumulators currently available in 0.5 and 2.0 Liter internal volumes. These compact, lightweight composite accumulators provide unmatched form and functionality for any weight-restricted applications where mobility and strength are top priorities. A new MicroForce diaphragm accumulator has been filament wound with recycled carbon fiber to demonstrate the importance of collaboration in recycling throughout the composites supply chain and the ability to create innovative products using recycled carbon fiber to reduce embodied energy and cost. COPVs using low cost recycled carbon fiber could find additional use in applications for mobility, aerospace, oil and gas, and renewable energy.

Curved Pultrusion Process Applied to Highly Engineered Hollow Profiles

Shape Corp

Shape Corp has developed a curved pultruded component that will start production in 2019. This specific product is for an automotive application; however, the process and materials might be best served for many other industries and applications. The part will be made with a Urethane Acrylate resin system; however, the team has tested a variety of different Poly Urethane's and Epoxy systems. This is the first ever curved pultruded "hollow section" profile that has been awarded for a production application. From material development, process and product innovations, and CAE methodology, this project exemplifies a holistic engineering approach for today's composites.

Development and Launch of Integrated Slide-in Oven Console Assembly w/ Stainless Steel Appearance Via Physical Vapor Deposition (PVD)

FINALIST

Mar-Bal, Inc.

The consumer appliance sector comprises a complex mix of buyer preference, brand identity, feature-based model design, application-specific performance characteristics, safety / regulatory elements, and of course, price. Balancing all of these factors along with the interplay of material characteristics, production technologies, Design-for-Manufacturing (DFM) guidelines, throughput yield, stringent quality criteria, and of course, cost, can be a significant undertaking. When the aesthetic requirements of high appearance components are added into the equation, the result is a very challenging dynamic for both the Tier 1 AND the OEM they service. Polymer materials, both thermoset and thermoplastic, enjoy extensive use in the design / manufacture of consumer appliances. In the cooking segment, with elevated temperature being a primary in-service condition for certain high appearance components, thermoset composites have long been the material of choice. The reasons are many, but key aspects include stability of properties over a wide temperature range, design freedom, ability to be produced in high output molding processes, and favorable production economics. In addition, the formulation flexibility inherent in thermoset composites allows material developers to address myriad aspects of a cooking components' value equation while in parallel designing high aesthetics into the thermoset compounds they develop. Recent trending toward stainless steel as an aesthetic category favored by consumers has challenged brand managers, industrial designers, OEM platform engineers, and components suppliers. Often the desire is to have stainless steel components [in this case in the form of oven handles / vent trims / consoles / etc.] available for use in as many model / price point combinations as is possible. But the cost limitations of using solid stainless steel along with the bounded applicability of stainless steel casting / stamping / fabrication processes relative to the design-price relationship has restricted proliferation of this favorable design trend within the OEM's portfolio. The innovation comprises the development, launch, and production of an integrated console assembly for a Whirlpool slide-in oven. The console includes a thermoset composite produced via high output thermoset BMC injection molding, imparting a brushed stainless steel look by way of Physical Vapor Deposition (PVD), and a value-add assembly step where an escutcheon and other components are added. Unique aspects of the innovation include a forward-looking design which would be difficult / impossible with other metal processes, ongoing improvements in throughput and component economics, along with a high level of combined collaboration amongst many Tier 1 / OEM teams.

GFRP Wicket Gates: Long Lasting Structures to Ensure Navigable Waterways

FINALIST

Composite Advantage, LLC

Government engineers teamed with academia and an innovative manufacturer to produce a novel composite materials product proven as a successful replacement for standard chanoine-type wicket gates made of white oak. Innovation was required in three areas: (1) development of glass fiber reinforced polymer (GFRP) composite material configuration, (2) development of a new gate manufacturing process, and (3) optimization of structural design. This innovation is the first navigational structure made of composite materials to be used by the U.S. Army Corps of Engineers (USACE), which maintains navigation on the nation's valuable waterways. Wicket gates create an adjustable dam by controlling pool levels and allowing river traffic to flow without locking through the lock chamber. The new product works the same way, but exceeds existing gate performance in cost, durability, maintenance, and safety. The innovative GFRP composite wicket gate costs 40% less on a first-cost basis, provides an environmentally conscious alternative to old-growth hardwood, and increases a gate's lifespan from 15 years to 50 years. A longer lifespan saves repeated installation costs, increases diver safety by avoidance, and projects virtually no maintenance costs. The product has been proven successful through research, design, testing, and validation in actual river use. A 2018 budget request was submitted by USACE's Rock Island District to replace all existing timber wickets with composite wickets at two Illinois River sites. At those two sites alone, replacement with GFRP wicket gates will save $18.6 million in materials and labor over 50 years, providing a return on investment of 28.6:1 on development expenditures of $650,000. This product's innovation paves the way for the use of GFRP composites nationwide by USACE and other governmental agencies on a multitude of additional navigation and water-control structures with even more demanding performance requirements, such as large culvert valves and radial gates.

Halls River Bridge – FRP Composites for Next Generation Infrastructure FINALIST

Florida Department of Transportation

As part of the FDOT's Transportation Innovation initiative, this bridge replacement project is an example of the next generation of infrastructure. Focused on achieving new levels of durability, life-cycle cost reduction and long-term performance, collaborative research and design development led to embracing FRP technology for the replacement of Halls River Bridge. This project is a proof of concept for complete bridge design solutions for the future, using a variety of forms of FRP and hybrid composite structural elements. FDOT standardized many FRP structural elements for use on this project, including:

1. CFRP Prestressed Concrete Bearing Piles
2. CFRP Prestressed/GFRP Reinforced Concrete Sheet Piles
3. GFRP Reinforced Bulkhead Caps, Traffic Railings and Approach Slabs
4. GFRP Reinforced Gravity Walls

Additionally, GFRP reinforced concrete designs were incorporated into other customized structural elements including: the bridge deck and end diaphragms; bridge foundations, bent caps, walls, and bulkhead/seawall caps. Hybrid Composite Beams (HCB's) were also utilized, leveraging the combined strength of FRP laminates, galvanized steel strand and concrete.

Significant Weight Reduction of Aircraft Seat

Oxeon AB

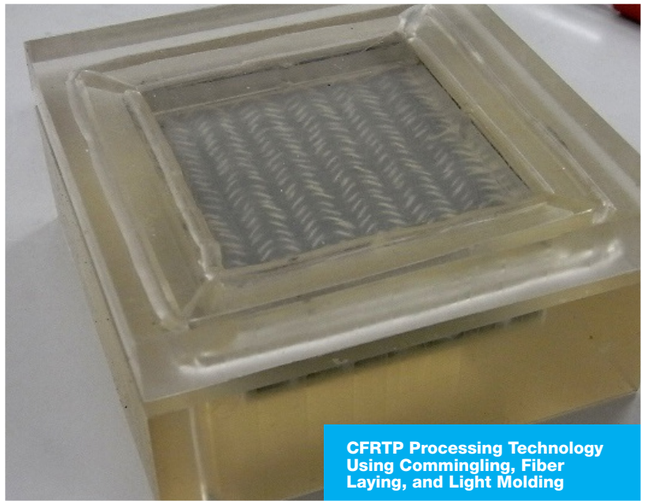
HAECO searched for a material that would reduce weight and thereby enable significant savings in fuel costs for the airlines. HAECO turned to TeXtreme® to help optimize their current seat design for weight, while still maintaining mechanical properties. TeXtreme® used calculation, simulation and manufacturing support to help HAECO reduce the weight of the aircraft seat by almost 20%. Thanks to its extensive experience with its Spread Tow Fabric, TeXtreme® has wisely optimized the composite lay-up by placing the appropriate TeXtreme® product in the right position and orientation. Also, the TeXtreme® fabric has been judiciously used so that its specific architecture could help for a better bearing performance and resistance to cracks propagation. Not only has TeXtreme® achieved a significant weight reduction while maintaining the desired stiffness but it has also contributed to save some manufacturing labor by decreasing the number of patches used.

Thermoplastic Composite Overmoulding Technology Reduces Cycle Time to Minutes FINALIST

Victrex

Overmoulding of thermoplastic composites is a technology in which a thermoplastic composite is thermoformed and subsequently injection overmoulded. The near-net-shape manufacturing process is well suited for automated large series production of complex 3D structures with excellent structural performance and a high level of function integration. The innovation features a typical grid stiffened panel that can be found in larger numbers in aero engine applications. The stiffness and strength performance combined with extreme dimensional accuracy puts high demands on the manufacturing process.The panel consists of a thermoplastic composite insert that was press formed using TenCate Cetex® TC1225 engineered C/PAEK, which was then overmoulded with VICTREX™ PEEK90HMF40. The relatively low melting temperature of the composite's PAEK polymer enables overmoulding with PEEK at a moderate insert temperature. The heat of the injected polymer is used to melt the surface of the solid insert upon contact. This makes the material combinations extremely suitable for a two-step overmoulding process. Numerical models were developed to predict two important aspects that are involved: 1.) Development of the interface between the composite insert and injected polymer during injection moulding, and 2.) Part warpage and spring-forward as a function of process-induced and shrinkage stresses. The models were validated on simplified test geometries as well as the grid stiffened demonstrator part. The project was established with the aim to create (numerical) design tools based on the basic mechanisms that underlay the overmoulding of thermoplastic composites using commercially available software packages. The work was carried out by the TPRC and funded by industrial partners from both the aerospace and automotive industry.

9 Meter Wind Turbine Blade Advanced Technology Demonstrator



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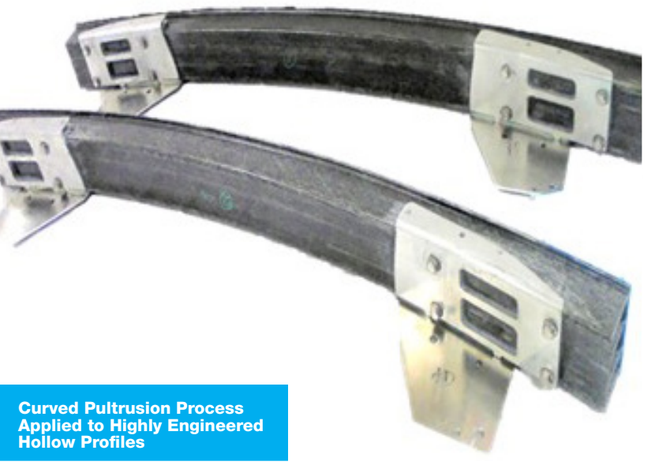

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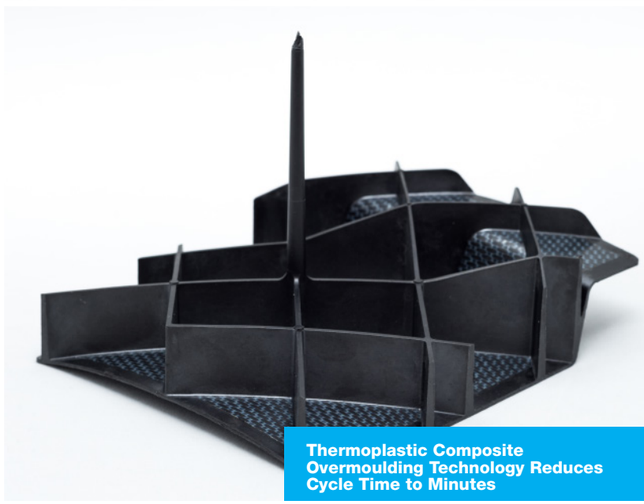


Thermoplastic Composite Overmoulding Technology Reduces Cycle Time to Minutes

UNSURPASSED INNOVATION AWARD

This award is presented to the composites product that clearly demonstrates a novel design that incorporates low-cost materials for high-volume applications or with high performance applications with low-volume materials which delivers a product that is innovative and has the potential to either significantly impact existing or open new markets.

Bio Material Spray-up and Dispensing Unit

Sunstrand

This novel bio material spray-up system from Sunstrand, is designed to augment chopped fiber glass spray up systems. The system consists of a mechanized hopper/ feeder, and a pneumatic delivery tube. The delivery tube simply attaches to your existing chopper gun with a simple bracket. The bio material is used to offset virgin glass fiber, or as a core filler. It can replace a significant amount of glass fibers when fibers are used as a bulking material to increase the thickness of a composite part. Its advantage over glass fiber include lower cost and lighter weight using a rapidly renewable feed stock. It can also be used as a core filler to replace commonly used balsa and foam sheets. As a core material, it has an advantage over balsa and foam as it can easily and quickly apply core material onto complex curved geometries at user defined varying thicknesses with a lower VOC emission than spray foams.

Carbon Fibre / Kevlar Hinge System

FINALIST

Talon Technology

A unique mix of the strength and stiffness of carbon fibre and flexibility of Kevlar, combine to create a product that is simple in design yet will have a powerful influence on a broad array of potential products. Highly adaptable the hinge can be the lightest and thinnest hinge in the world.

Comprehensive Composite Manufacturing Platform

Autodesk

Autodesk provides a comprehensive set of tools creating an end to end solution for composite manufacturers. This composite manufacturing tool provides highly functional capabilities to novice and expert companies alike. Autodesk's Any CAD philosophy provides a sturdy backbone for existing composites users to import and begin improving on their designs. The composite design utilities allow new designs to be created intuitively within the standalone 3D modeling kernel. Define material catalogs, rosette orientations, engineering and manufacturing surfaces, ply geometry, and layup sequences with easy-to-use functionality. Add manufacturing edges to composite geometry, swap surfaces, add additional manufacturing plies post engineering, and splice composite geometry based on material packaging. Simulate composite stress, strain, fatigue, impact, warpage, and progressive failure. Incorporate these simulations back into the design for continual improvements. Analyze the manufacturability of processes like hand layup, automated fiber placement and tape laying, resin transfer molding, and forming. Autodesk's simulation and analysis tools allow for early access to potential problems with the design and manufacturing process, keeping cost down with low iterations. Companies using hand layup can create 2D flatten patterns, program laser projection equipment, nest for use on composite cutting machines, and track materials, kits, and plies from freezer to autoclave. When using thermoset materials, 3D nest tooling inside of the autoclave based on temperature distribution and airflow for maximum efficiency. Upgrade to automated manufacturing processes like fiber placement and tape laying with a machine agnostic programming, editing, and simulation environment. Increase production rates with processes like composite forming, resin transfer molding, and injection molding. By providing access to all these technologies integrated into the same platform, Autodesk allows companies to adopt new technologies, improve existing workflows, and open the door for composite manufacturers of all expertise.

Digimat Additive Manufacturing

e-Xstream engineering

Additive Manufacturing (AM) enables the manufacturing of very complex shapes and helps achieve lightweight functional designs thanks to the combined benefit of optimal topology, function integration and the use of the optimal material. This is particularly true for plastics & composites if the AM industry is able to offer:

- A larger portfolio of high performance materials;
- Bigger, faster and cheaper printers;
- The design and analysis tools needed to increase confidence in the ability to "printed right the first time":
  - Control printed part fidelity
  - Optimize and master manufacturing process quality
  - Optimize part performance as a function of process setup and material choice.

Following a Stratasys internal survey, among the top three issues with the greatest impact on the AM market, respondents emphasized the limited portfolio of available materials and the as-printed mechanical properties

To address the AM industry needs, e-Xstream, the material modeling company, has delivered a holistic simulation chain for plastics and composites with the unique combination of material engineering, process simulation and structural engineering:

MATERIALS: e-Xstream is extending its material engineering tools to engineer advanced composite materials specifically for Additive Manufacturing. Material models can then be promoted and exchanged via the material exchange platform Digimat-MX.

PROCESS: e-Xstream is developing a new software solution, Digimat-AM, 100% dedicated to process modeling of Fused Deposition Modeling and Selective Laser Sintering of reinforced materials. Digimat-AM addresses the industry global need to "print right the first time".

PART PERFORMANCE: e-Xstream is extending its Digimat structural analysis solution to enable product designers to simulate the printed part performance as a function of the material and the printing setup. By accounting for the printing direction and the effects of defects, customers are now able to perform accurate structural analyzes and bring more confidence in the design validation of Plastic and Composite parts.

Edge En V. Fly Rods Made with Ekoa Plant Based Prepregs

FINALIST

Lingrove

For the uninitiated, fly-fishing is an angler method where an artificial and nearly weightless "fly" is cast to catch fish. Casting these lightweight lures depend on the weight of the fly line and physical characteristics of the fly rod, hence the importance in material selection in the production of these fly rods. Edge rods, a subsidiary of Northfork Composites, serves the fly-fishing/sports market from beginners to professional anglers. Edge rods launched the En V. Fly Rods in 2016, which like all of Edge models are designed by legendary rod maker Gary Loomis. He was a major innovator around the introduction of carbon fiber rods for high performance and long casting. The En V. Fly Rods are the debut fishing rods made with Ekoa® Linen/bioresin prepregs and the next evolution in the fly-fishing world: offering the action, a.k.a feel of traditional fiberglass with the fast recovery of graphite. The appeal of a fiberglass rod is the classic slow action really helps the angler feel their casts. Now because of the unique properties of Ekoa composites, the angler can have the best of both worlds.

First Industrial Fiber Patch Placement System for Manufacturing Complex Composites

FINALIST

Cevotec GmbH

Complex-shaped composites are still manufactured by hand - up to now. Cevotec offers with SAMBA the first industrial Fiber Patch Placement (FPP) production system together with the matching CAD-CAM software ARTIST STUDIO, enabling automated production for complex composites. The process starts with dry carbon fiber tape that is laser-cut into patches. The patches are picked up by a handling robot, equipped with a special gripper, and placed on a 3D form tool that is mounted on a 6-axis robot. Patch by patch, complex preforms are produced using this additive manufacturing technique. SAMBA breaks the “endless fiber paradigm” of the composites industry by using discontinuous patches for high performance applications instead of the commonly used continuous fibers. This yields two major advantages:

1. Automation of fiber deposition on complex shapes: the extremely form-flexible gripper enables the placement of patches on complex shapes like strongly convex and bi-axially curved surfaces.
2. Curvilinear fiber orientations: Because each patch is individually deposited on positions predetermined by the ARTIST STUDIO software, its orientation can be adjusted to follow curved load paths. This increases the strength and stiffness by up to 150% compared to conventional laminates and overcompensates the performance loss that is initially induced by using discontinuous fiber patches (scientifically-proven results).

By generating both optimized laminates and efficient robot movements, fiber material costs and production cost are significantly reduced, while the product development process is significantly accelerated. ARTIST STUDIO enables engineers to exploit the full advantage of the Fiber Patch Placement technology.

With SAMBA and ARTIST STUDIO, Cevotec’s customers have access to an industrial production system which can be used flexibly for a wide range of applications across a range of industries such as automotive, aerospace, medical devices, sports equipment and industrial goods. Three primary application areas have the largest potential:

1. Complex-shaped parts (e.g. aerospace window funnels, gearbox covers)
2. Load-path-oriented reinforcements (e.g. of stacks, reducing the number of stack plys)
3. Ornamental surfaces (e.g. letters, logos, designs)

These applications are estimated to address more than USD 2 billion in composite applications, or more than 10% of the market. Application areas will expand as Cevotec continues to extend the patch technology to larger sizes, and also to additional materials, e.g. thermoset and thermoplastic prepreg tapes as well as glass fibers.

Low Cost Carbon Fiber (LCCF)

Oak Ridge National Laboratory

Carbon fiber is a strong, stiff, lightweight enabling material for improved performance of composite structures in many applications. The LCCF production method is focused on the utilization of textile grade acrylic fiber as the precursor material and other cost saving production processing steps to decrease the overall carbon fiber production cost. Acrylic fibers are converted to carbon fibers by heat treatment through multiple heating steps, with each step becoming successively hotter. The first heat treatment step is rate limiting due to high exothermic heat generation. Textile acrylic fibers exhibit slower reaction kinetics and therefore run at slower line speed than specialty acrylic fibers. ORNL’s proprietary heat treatment process exploits the reaction kinetics to dramatically increase fiber areal weight without fiber fusion during heating, thus increasing heat treatment throughput. With this “break-through” technology the LCCF now enables the availability of low cost, very strong, stiff lightweight materials for use in the fabrication of composite components and structures suitable for high volume cost sensitive applications.

Next Generation CoCure Hybrid Metal/Composite Technology for Transportation

FINALIST

Structural Composites, Inc.

The entry is the next-generation CoCure hybrid metal/composite technology for transportation. The technology is being demonstrated with a game-changing fully certified, road-rated composite 53’ refrigerated van for the cold chain market. The all-composite refrigerated van not only includes composite walls and roof systems but also features a new hybrid metal/composite integrated floor that, when combined with the wall and roof systems, provides significant improvements in load rating, weight, thermal efficiency and longevity. CoCure technology offers 3 product families: CoCure Coatings, CoCure Structural Resin and the latest product, CoCure Adhesives, allow for direct lamination of metals and composites. The technology allows the blending of metal and composites throughout the manufacturing process. Direct lamination of metals allows for cost, efficiency and weight savings. In the case of Wabash National 53’ Cold Chain refrigerated van, the wear surface (ducted metal extrusions) is bonded in-mold to the composite load structure using CoCure technologies. CoCure advanced coatings protect the wall and roof panels with a gel coat-like finish, but also offers a tough flexible coating providing increased toughness and puncture resistance over conventional aluminum or composite construction. CoCure composites provide high performance at costs that compete with traditional materials. Wabash National’s 53’ Cold Chain refrigerated van is a breakout from standard design. Conventional refrigerated vans have a 16,000 lb. fork lift load rating, while conventional 53’ dry vans have a 22,000 lb. floor rating. Wabash National’s 53’ Cold Chain refrigerated van with a CoCure hybrid metal/composite floor has a certified fork lift rating of 24,000 lbs. This allows the van to be a multi function platform able to be used for conventional refrigerated loads or for more demanding dry freight loads. This maximizes the utility and value the van brings to the customer.

Recyclable Thermoset Chemistry for Sustainable Composites

Adesso Advanced Materials

Adesso has developed the world’s first recyclable epoxy resins, employing Adesso’s proprietary Cleavamine degradable curing agents. Carbon fiber reinforced composites made with such recyclable thermoset resins demonstrate not only excellent mechanistic properties, but also easy recyclability under specific and benign chemical conditions. As such the CFRP waste during manufacturing or CFRP parts after the end of their useful life can be recycled to recover valuable carbon fiber for reuse as composite parts and degraded thermoset resin as thermoplastics. Adesso develops and demonstrates recyclable epoxy formulations that will enable recovery of both carbon fibers and resins from high-performance composites, eliminating costly waste disposal fees and recovering high-value components.

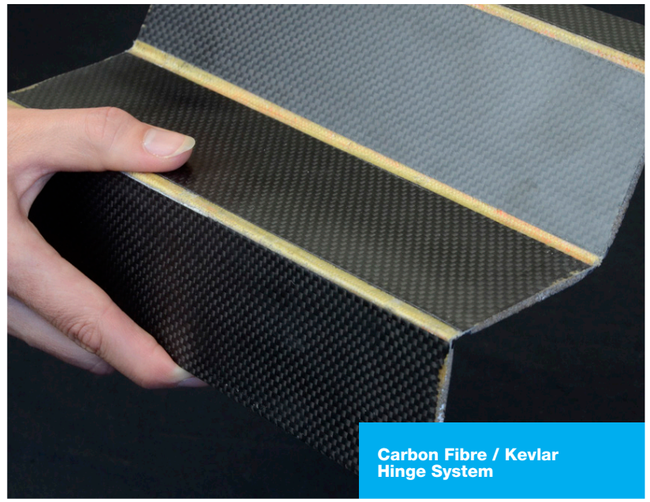
Secure Hybrid Composite Maritime Shipping Container

FINALIST

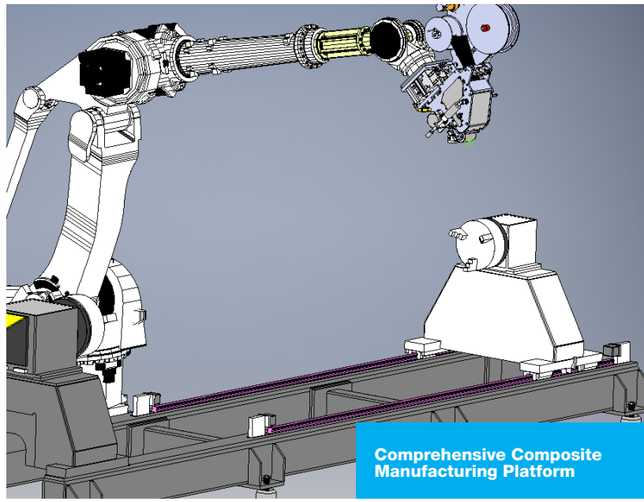
University of Maine - Advanced Structures and Composites Center

The University of Maine has designed and built a Secure Hybrid Composite Maritime Shipping Container (SHYCC). It is the first secure intermodal composite shipping container that provides six-sided intrusion detection, real-time tracking, door opening alerts, and secure global communication. This technology enables government agencies and commercial high-value good producers to fight tampering by sophisticated adversaries or terrorist organizations, and minimize loss from theft, damage, or spoilage. No shipping container is available today that offers all of the security features of SHYCC desired by these customers, particularly full six-sided tamper detection. The patented SHYCC technology uses weldable composite panels allowing composites to be processed in existing steel container manufacturing facilities. The SHYCC design keeps the steel frame, corner castings, and door hardware features of a conventional container while the wall, roof, and floor panels are replaced with composite panels with embedded intrusion detection grids. Composites reduce the weight of the container by 20% and protect the embedded intrusion sensors from damage in the shipping environment. The ultimate goal of the container is to provide the level of security to law enforcement officials to ensure weapons, contraband, or other materials have not been inserted into the container for smuggling into the US. Within the commercial shipping environment there is $50-$60B of cargo theft every year, approximately half -- $25B to $30B -- occurs in the US. High value product shippers of electronics and pharmaceuticals are the most common targets. SHYCC is the first ISO-certified composite shipping container. It offers advanced security features while meeting all the operational, structural, and customs requirements of standard steel 20ft and 40ft shipping containers. It is fully and seamlessly interchangeable with existing steel shipping containers and is visually indistinguishable from a steel container.

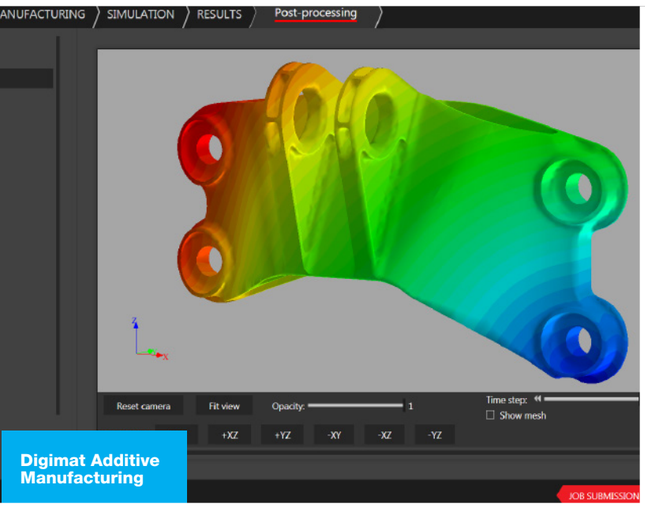
Bio Material Spray-up and Dispensing Unit



Carbon Fibre / Kevlar Hinge System



Comprehensive Composite Manufacturing Platform



Digimat Additive Manufacturing

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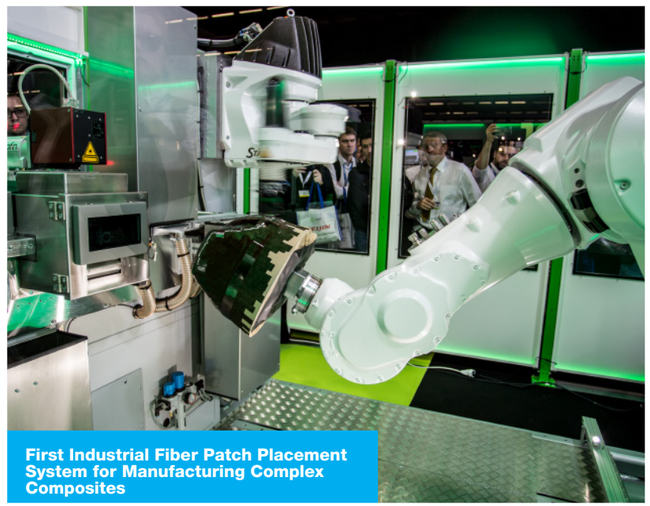
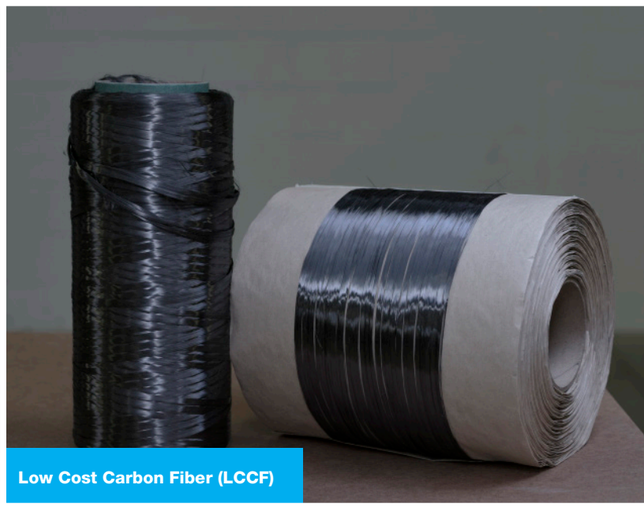


First Industrial Fiber Patch Placement System for Manufacturing Complex Composites



Low Cost Carbon Fiber (LCCF)

Next Generation CoCure Hybrid Metal/Composite Technology for Transportation

Recyclable Thermoset Chemistry for Sustainable Composites

Secure Hybrid Composite Maritime Shipping Container

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