TECHNOLOGY SERVICES IDEAS

MARKET VISION

for composite solutions

SPRING 2008

Insulating LNGTankers with Unifilo® Mat

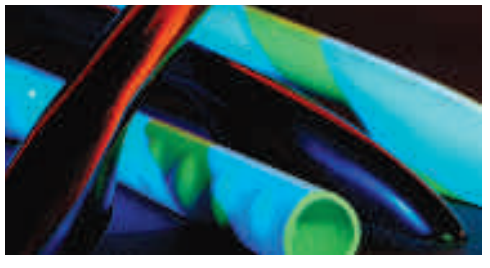
ShieldStrand™ Reinforcements Provide Ballistic Protection

Composite Railroad Bridge Passes Live Load Test with Advantex® Reinforcements

Sustainability finds a friend in composites

OCV® Reinforcements | OCV® Technical Fabrics | OCV® Non-Woven Technologies

CONTENTS



EDITORIAL

COMPOSITES INDUSTRY NEEDS TO LEAD SUSTAINABILITY

A few years ago, I caused a commotion by saying the composites industry needs to "go green or go home." The comment was made during a 2005 presentation at the American Composite Manufacturers Association conference and exhibition.

During that talk I said green legislation and green demand will soon dictate how we run our companies. I said green is driving how customers use our products and the speed at which composites can leapfrog the competition. Now, a little more than two years later, my statement seems a lot less radical and we see more and more evidence of the world turning green.

The OCV businesses are committed to being a leader in energy efficiency and environmental responsibility. The businesses have 42 production facilities in 16 countries and total energy cost is already a large component of the cost of production, which has increased significantly with no end in sight. Reducing our use of energy will be a very high priority going forward.

The recently acquired facilities were already working hard to reduce energy use and greenhouse gas emissions. As we pool our resources in the OCV businesses, we are discovering other opportunities for energy efficiency that we will incorporate across all of our operations.

How can your company make a difference? First, put a stake in the ground by identifying baseline performance levels and set ambitious energy efficiency goals. Hold yourself accountable to deliver on your sustainability targets and engage your leadership in those goals. Define how you will hold people accountable for their energy performance, then establish a compensation connection to drive profitable sustainability.

Think about energy efficiency and sustainability as a journey of continuous improvement. Be proud of your progress, but understand that there is much more to be accomplished.

Chuck Dana

Chuck Dana
President
Composite Solutions Business
Owens Corning

Trade Shows Keep Us Busy in April

The OCV businesses and its customers are very busy in April with four major trade shows in as many countries. Three of the shows take place on the same days.

The booth includes eco features including high efficiency lighting and reusable natural materials

JEC Composites, April 1-3, Paris, France

JEC is one of the world's largest trade shows for composites and the 2008 edition is first to take place since the three OCV businesses were created.

"We look forward to greeting our customers as a combined organization," said Arnaud Genis, Vice President and Managing Director, Europe, OCV Reinforcements, Global OCV Technical Fabrics and Specialties.

"JEC attracts a global audience so it is a great platform for introducing the combined strengths of our people, our technical capability and our products. We expect to see many friends and talk about what we can do together to expand the market for composites."

The principal colors on the stand are red and green. The first one reflects the company and gives a cozy feeling to the booth; and "green" is the theme. The stand's "eco" design and features set the stage for presentations and discussions about the growing importance of the environment and sustainability.

Eco features on the 750-square-foot (250-square-meter) stand include:

- Natural materials that will be reused later
- High efficiency lights
- Marketing materials primarily distributed on USB keys
- Use of recycled papers and vegetable inks for other printed materials (estimated at 75 percent fewer than other years)
- Give away (mouse pad) made with recycled cups
- Catering using organic juices/food and recycled cups

Scientists and marketing leaders will make several presentations on the stand:

- Sustainabilty and the Composites Industry - Georg Adolphs
- Closed Mold Benefits for Health and the Environment - Marc Vautrin
- Wind Energy and Direct Roving - Eric Dallies
- Twintex® Products: An Alternative to Wood and Aluminum - Philippe Pardo
- Multi-Process Comparison - Gilles Rocher
- Market Insight: Opportunities for Composites in Russia - Maxim Kudryavtsev

The front end of the Audi Q7 is made using OCV Reinforcements TWINTEX® long fiber pellets (Plastic Omnium Auto Exterior, France)

COME SEE US

The OCV businesses will be at these upcoming trade shows:

- **Techtextil North America 2008**, April 1-3, Atlanta, Ga., U.S.
- **JEC Composites 2008**, April 1-3, Paris, France
- **Glass Fibre Reinforced Concrete Association Congress**, April 20-23, Prague, Czech Republic
- **China Composites**, September 17-19, Shanghai, China
- **IBEX**, October 6-8, Miami Beach, Fla., U.S.
- **SAIE**, October 15-18, Bologna, Italy
- **International Plastic Fair**, November 7-11, Makuhari, Japan
- **FEIPLAR Composites 2008**, November 11-13, Sao, Paulo, Brazil
- **Composites & Polycon 2009**, January 15-17, Tampa, Fla., U.S.

European Wind Energy Conference & Exhibition, March 31-April 3, Brussels, Belgium

The European Wind Energy Conference & Exhibition is organized annually by the European Wind Energy Association. It encourages the exchange of international experience on policy, finance and technical developments, and showcase the latest technology.

WindStrand™ high-performance reinforcements were introduced at the show two years ago when it was held in Athens, Greece. OCV Reinforcements and OCV Technical Fabrics are major suppliers to the industry.

Techtextil North America, April 1-3, Atlanta, Ga., U.S.

Techtextil North America is the most comprehensive North American trade show and symposium for technical textiles and non-wovens. The world's leading companies in the industry meet there for education, networking and business development. OCV Non-Woven Technologies is attending the show to talk with customers.

Congress GRC, April 20-23, Prague, Czech Republic

The International Glassfibre Reinforced Concrete Association hosts its Congress to exchange knowledge and experience concerning glass fiber reinforced concrete (GRC). Participants also help establish codes of practice and national standards covering manufacture and performance.

Composed principally of cement, sand and special alkali resistant (AR) glass fibers, GRC is a thin, high-strength concrete with many applications in construction. For this market, OCV Reinforcements provides a variety of alkali-resistant Cem-FIL® specialty products. All of these products will be on display in Prague.

"Trade shows are a busy time for everyone involved," added Nicolas Bedouin, Sales and Marketing Leader, OCV Reinforcements, Specialties, "but they really provide an efficient way for all of us to get together and share information. The shows in April will help set the agenda for the rest of the year as we work to increase the market for composites and grow our businesses."

The Greening of

Nimble Businesses Find Market Opportunities

Once upon a time, the composites industry saw the proverbial "green" glass as less than half full. They saw mostly threats in the environmental movement as thermoset composites were criticized for being hard to recycle and proposed regulations limiting emissions were jeopardizing production.

Now, almost 38 years after the first Earth Day, recycling possibilities have been developed, reinforced thermoplastics have emerged and the durability of composites is seen as a positive factor in sustainability. During the same period, the industry developed new materials and processes that substantially reduced volatile organic compounds (VOCs) and environmental regulations are not as draconian as once feared.

Even more important, perhaps, is that composite fabricators found significant business opportunities in the environmental market.

Components for Wind Energy

One such company is Molded Fiber Glass Companies, a privately held enterprise headquartered in Ashtabula, Ohio, U.S. The company includes 15 entities in 10 states and Mexico, and employs about 2,000 teammates.

"We liked wind energy because it used our product (composites) and it was a clean form of energy."

Richard Morrison, President & CEO
Molded Fiber Glass Companies

MFG President and CEO Richard Morrison said the company is delighted to participate in the growth of the wind energy market today, but it has been a bumpy ride.

"We have some battle scars," explained Morrison. "We got into the market in the late 1980s and it was way too early. The market was very up and down in the 1990s before several large companies got into the business and it took off."

MFG entered the market making wind turbine blades for Zond Energy Systems (later acquired by Enron and then GE).

MFG made the blades at its fabrication facility in California.

"We started by making these huge 8.2- and 9.1-meter blades," said Morrison with a chuckle. "Of course, blades are more than four times that size today."

Morrison said it became obvious in the 1980s that other sources of energy had to be found. "We liked wind energy because it used our product (composites) and it was a clean form of energy. We got into it with the idea it would become a good business for us, but it did not – not for many years."

Last November, MFG announced plans for a new wind turbine manufacturing plant in Aberdeen, S.D., U.S. The plant will fabricate blades for GE's 1.5-megawatt machine, one of the most widely used wind turbines in the world.

From an operational perspective, Morrison said his company has changed a great deal in becoming a more environmentally friendly business. And while progress has been steady, he has opted for science-based, long-term solutions instead of a headlong rush to unproven theories.

"We need to be careful not to implement an idea that has unintended consequences," he explained. "We need to take the time to really understand the problem and implement a proven solution."

Composites

> *"…composites have found a home as a replacement material that will last a long time, which is an important part of sustainability."*
>
> *Mike Beaupre, Vice President*
> *Bedford Reinforced Plastics*

Longer-lasting Cooling Towers

Another company benefiting from the strength of the energy market is Bedford Reinforced Plastics in Bedford, Pa., U.S. The company makes pultruded composite profiles and one of its largest applications is cooling towers for power plants.

"Cooling towers are basically radiators," said Mike Beaupre, Vice President of Operations at Bedford Reinforced Plastics. "They have been constructed out of metal and wood, but composites have found a home as a replacement material that will last a long time, which is an important part of sustainability.

"Years ago, the designers used redwood because it was the best wood they could get at a reasonable price. But with redwood getting tight, they're looking for other materials. Reinforced plastics offer a good substitute because they are strong, moisture resistant and long lasting.

"Another advantage compared to wood is that we can make parts any length they want," continued Beaupre. "So where they might want to use a 50-foot column in wood, they rarely ever find a 50-foot piece of wood. At Bedford, everything can be cut to length and supplied just as they would like to use it. Fabrication also helps in that market because we will prefabricate everything before it goes to the job site. When the parts arrive, all they have to do is put them together."

Beaupre said business has been good because utilities are playing catch-up with cooling towers they avoided upgrading in the past five years.

Bedford Reinforced Plastics was founded in 1974 and is still a family-owned business. The company moved to its present site in 1983 and has since expanded about every two years. It is now looking at property for expansion.

One of Bedford Reinforced Plastics' largest applications is cooling towers for power plants.

"We've been working with Owens Corning since '74 when our company started," continued Beaupre. "We really need consistency in the raw material coming in if we're going to make a consistent product going out."

Environmentally Friendly Pipe

Flexpipe Systems developed a very green way to make and install composite pipe for oilfield applications.

> *"Our clients appreciate the fact that being environmentally friendly doesn't cost them money."*
>
> *Dean Zipse, Vice President*
> *Flexpipe Systems*

The company produces glass fiber-reinforced polyethylene pipe for natural gas and oil fields that can be installed quickly with minimal disruption to the environment. The thermoplastic polymer used as the internal bladder and outer jacket of the pipe is inherently corrosion resistant and the few joints required to connect the pipe substantially reduce the potential for leaks.

Headquartered in Calgary, Alberta, Canada, Flexpipe Systems traces its roots to research and development work at the University of Calgary beginning in 2001. The originators came up with a way to extrude and reinforce thermoplastic pipe and wind it up on reels that contain a half mile of pipe. They then developed a field-friendly connecting system to join the lengths. The company sold its first commercial project in 2003 and today an experienced crew can install a full mile of pipe in 30 minutes, including the mid-point connection.

"At the end of the day the site looks like a couple of pickup trucks drove over the field," said Dean Zipse, Vice President, Sales and Marketing. "That's much less environmental disturbance than other pipeline systems."

Zipse said the system includes other field-friendly and environmental features, such as the fact that reels of pipe will fit under most overpasses and are light enough to be unloaded with a typical forklift truck. Soil disturbance is reduced because Flexpipe can be installed using a narrower trench and smaller right of way than conventional steel pipelining, or it can be plowed in without trenching.

According to Zipse, steel pipe requires as many as 140 welded, X-rayed and coated connections in a mile of pipe. "Our clients appreciate the fact that being environmentally friendly doesn't cost them more money," added Zipse.

"We sold 400 kilometers (248.5 miles) of pipe in our first year," said Zipse. "Today, we see that demand in a month. We expect to make and install more than 2,000 kilometers (1,242.74 miles) of pipe in 2008."

Glass fiber-reinforced polyethylene pipe is installed quickly with minimal disruption to the environment.

The Greening of Compo s

Materials for LNG carriers keep the product cold and have the compressive and tensile strength for shipyard application

> *"As a result of the Montreal protocol, customers are asking for more environmentally friend products, especially to eliminate the use of CFC and HCFC blowing agents."*
>
> *Sung-Hoon Kim, Director*
> *Finetec Research Institute*

Insulating LNG Tankers

Finetec Corporation developed a hot business making products for extremely cold applications. The company produces cryogenic insulating materials for huge LNG (Liquified Natural Gas) ships.

Headquartered in Ansung City, Korea, the company started operations in 1985. Their product is a fiberglass-reinforced urethane foam product they call R-PUF (Reinforced Polyurethane Foam). Finetec has the capacity to equip 16 LNG vessels annually.

The company was started after its founders noted that demand for LNG was increasing as an advanced, clean energy source with less harmful pollutants than conventional petroleum sources. As a gas, it is lighter than air with high thermal efficiency. For efficient transport, purified natural gas is compressed by a ratio of 1:600 by cooling it to -163C. Cryogenic insulating systems are thus essential for both processing facilities and delivery mechanisms.

According to Sung-Hoon Kim, Director of the Finetec Research Institute, the company is a major provider of cryogenic insulation materials to all shipyards in Korea producing LNG/LPG carriers.

"Korean shipbuilding is best in the world market," said Kim, "and heavy industries like Hyundai, Samsung and others have focused on LNG carriers and have about 70 percent market share."

Kim said materials for LNG carriers need to keep the product cold but also have the compressive and tensile strength to withstand shipyard application

"It is difficult to meet the properties required by the technical engineering company and also pass their strict quality inspections," said Kim. "But, with good quality reinforcements we can make the composite product need.

"The philosophy of Finetec is that we are making products for better life and the environment, and as part of that we are making the first CO2-blown R-PUF on a commercial scale in the world.

"As a result of the Montreal protocol, customers are asking for more environmentally friendly products, and especially to eliminate the use of CFC and HCFC blowing agents. Finetec has already complied and supplied such environmentally friendly products using CO2 (the GWP of CO2 is zero) to the heavy industries in Korea and Japan."

Livio Lionetti, Global Product Manager, Unifilo® mat, OCV Reinforcements, worked closely with Finetec on development of the new environmentally friendly C02-blown R-PUF.

"We had to develop a new Unifilo continuous strand mat to be compatible with the CO2 blowing agent," explained Lionetti. "The outcome is a new product - U809 - which replaces the traditional U801 product. The new mat is now fully approved and recognized as the optimal product for the application.

"This was achieved thanks to deep cooperation between Finetec and OCV Reinforcements," he added. "It is also a great example of our commitment to customers and a greener, cleaner world."

Diversifying leads to green products and processes

Cortiplás, s.a. was founded in Spain in 1979 to manufacture composite water tanks for homes. The company's original process was filament winding.

From that beginning, however, it was the company's intent to stay current in a changing world by diversifying its mix of products and adapting its manufacturing systems to the most modern technologies. That philosophy led the company into the production of residual water purifiers, hydrocarbon and oil separators, gas washing towers and components for the chemical industry.

Cortiplás also founded new companies to make components for wind energy; pipe for irrigation, canalization, drainage and desalination projects; parts for cooling towers; and sailboats from 23 to 30 feet (7 to 9 meters). Their processes have

sites

> *"We have state-of-the-art equipment for removing emissions from our production and protecting our workers from exposure to harmful chemicals."*
>
> *Manuel Rivas, Managing Director*
> *Cortiplas, s.a.*

grown to include continuous winding, spray up, infusion and resin transfer molding (RTM).

The group of companies now includes Castellano Leonesa de Composites, S.L., Coruñesa de Composites, S.L., Coruñesa de Plásticos, S.A., Europea del Poliester, S.L., Recubrimientos del Poliester, S.A., and Tubos de Castilla y Leon, S.A.

"Our company is exclusively dedicated to composites and I think that it will always be like this," said Manuel Rivas, Managing Director.

"Our companies are currently invoicing at an annual rate of approximately 40 million euros," he continued. "We employ 320 people at five manufacturing locations. In 2007, our company had growth of 18 percent and we expect it to be 15 percent 2008."

Rivas said his company differentiates itself in the market with quality.

"Our company is always striving to improve our quality and environmental performance," he explained. "For quality, we have obtained ISO 9000 certification, and for the environment we have ISO 14000. We have state-of-the-art equipment for removing emissions from our production and protecting our workers from exposure to harmful chemicals."

While indicating that glass fiber reinforcements are the "soul" of everything the company makes, Rivas said the most important contributions from OCV Reinforcements are service, technical assistance and competitive prices.

"The relationship between our company and OCV Reinforcements is flexible, serious and based on the fidelity obtained through years of doing business together."

Finetec is a major provider of cryogenic insulation materials to shipyards in Korea producing LNG/LPG carriers

ShieldStrand™ Reinforcements Provide Ballistic Protection

It's a deadly problem exploding out of today's headlines. Ever-increasing threats posed by roadside mines, improvised explosive devices (IEDs) and explosively formed projectiles (EFPs) require increased ballistic protection.

According to Wisdom Dzotsi, High-Performance Reinforcements Commercial Leader, OCV Reinforcements, these threats and the strain they put on defense and security budgets are making the ballistics and armor market very receptive to the value of ShieldStrand high-performance reinforcements.

"The armed services are continually searching for new combinations of materials that can withstand higher threat levels," explains Dzotsi. "Military leaders and armored vehicle manufacturers have been impressed with what ShieldStrand composite armor can do from a performance standpoint, as well as the value proposition it offers."

According to Vector Strategy, a research firm providing market intelligence for the armor industry, demand for high-performance ballistic fibers like ShieldStrand reinforcement was estimated to be 15 million pounds last year and growing 20 percent to 18 million pounds in 2008.

"The ballistics and armor market presents a perfect opportunity to execute our strategy of supporting customers and expanding the market for composites using high-value, cost-effective high-performance reinforcements," said Dzotsi.
"We are focused on moving the market to composites and away from steel, high-strength aluminum and depleted uranium – some of which are in short supply."

Most current armor solutions are driven by a metals culture and mentality that add weight and thickness to applications. There is a need for lighter weight material solutions with comparable or higher performance at lower cost.

"Increased weight reduces vehicle maneuverability, decreases the amount of payload that can be carried, increases wear and tear on vehicle drive train components, as well as increases fuel consumption," said Bill Mellian, Business Development Leader, Ballistic Armor.

"The military's future combat strategy requires vehicles that are lighter and more nimble. We are developing systems made with ShieldStrand reinforcements that are just as effective but thinner, lighter and less expensive."

Performance

"Composite armor is the best material to protect against both blast and fragmentation," said Dave Hartman, Research Associate, OCV Reinforcements Science and Technology.

Other composite armor benefits include corrosion resistance and dielectric properties to enable high-frequency communication.

"We are already qualified for systems that withstand the 'Frag 5' military specification for armor piercing projectiles," adds Mellian. "We are now working on systems for 'Frag 6,' which protects personnel from EFPs."

Multi-Pronged Delivery Effort

Composite armor has compelling performance benefits: however, entry to market has been slow. This is partly due to the metals mindset in the industry. Also complicating the materials' acceptance is a complex supply chain with intricate specification and performance requirements that stretches from the defense departments back through OEMs working on different vehicle platforms, to molders and pre-preg producers to reinforcement and fabric manufacturers.

Consequently, OCV Reinforcements has outlined a multi-pronged effort to identify the quickest and fastest routes to market and accelerate the material's specification. Mellian says Ballistic Armor is calling on everyone in the ballistics and armor value chain, from its weaver customers to the military leaders who will ultimately order the vehicles.

OCV Reinforcements is also working with a number of OEMs to develop new composite armor solutions for current and future generation vehicle platforms. One due out this year that uses ShieldStrand reinforcements is a rear seat partition to protect soldiers on a standard HMMWV(Humvee).

In addition, the company is working with armor suppliers and OEMs to substitute composite armor for metal. "For example, ShieldStrand Composite Armor is being considered for an application designed to stop EFPs," said Mellian. "The Frag 6 armor kit is for use on the Mine Resistant Ambush Protection vehicle (MRAP) slated for a production run of 16-18,000 vehicles."

Other solutions in development include an armor piercing protection kit for the Humvee and a Frag 6 armor kit to retrofit Humvees already in the field.

A composite future

Just as threats are evolving, Dzotsi sees the market for composite armor evolving and growing. "We will see the ballistic armor market transforming as the applications migrate from armor kits on existing vehicles to the use of composites throughout an entire vehicle."

Composite armor can also be combined with metal and ceramic materials in sandwich constructions that deliver enhanced performance versus that provided by any single material. And while much of the current interest is focused on vehicle armor solutions, there are also potential applications for ship and aircraft armor.

All of this means continuing opportunity for OCV Reinforcements customers in the armor and ballistics market.

New Businesses Benefit Customers

The OCV businesses have been working hard for their customers since the three businesses were created last fall. Their focus has been on leveraging the best of what each of the founding companies offered on its own.

"We won't be satisfied with adding the two businesses together," said Al Foster, Director, Strategy and Investment Composite Solutions. "We are striving for one plus one equals three or four - or more."

Foster says such activities are important to customers because they improve products and enable the business to be competitive and attract the investments needed for long-term growth.

"It has only been a few months since the new businesses were formed but we are already making great progress," said Foster.

> *"We worked hard to ensure that we and our customers win together."*
>
> *Charles White, Plant Leader, Guelph, Ontario, Canada OCV Reinforcements*

Sister plants exchange information

Among the first steps after closing the acquisition was pairing up the manufacturing facilities of both companies. Plants that were formerly part of two separate and competing companies suddenly had a "sister." They were asked to get to know each other and share information about everything - culture, operations, best practices, etc.

The reinforcement plant in Guelph, Ontario, Canada, was matched with the reinforcement plant in Besana, Brianza, Italy. Both make continuous filament mat (CFM). The plant in Kimchon, Korea, is sister to many of the plants in the region including Douidian (Beijing) and Changzhou in China; Tzu, Japan; and Gunsan, Korea.

Teams at Guelph and Besana have already bridged the 5,000-mile distance between their two facilities. Representatives from Guelph visited Italy late last year, and representatives from Besana made the trek to Canada in January.

"We had great interaction during both visits," said Charles White, Plant Leader at Guelph. "We formed friendships and worked hard to ensure that we and our customers win together. It was also unique to sit together, study and discuss what we, as competitors, had speculated about for years.

"Language differences were a minor challenge," continued White, "but we worked through that and established a very positive relationship very quickly. People from both facilities have identified steps they can take to improve product consistency, adjust their product lines and become more cost competitive."

Flavio Striseo, Plant Leader at Besana, said his plant will use Guelph's experience to optimize their ovens' energy use.

"This is very important for sustainability and because in Italy nowadays, energy is very expensive," explained Striseo. "We have already launched some projects and we have been able to reduce the gas consumption in one oven by 33 percent. For an oven that works 24/24, 365/365, the saving is really a lot of money. This is important to reduce our real cost of production and become more competitive in the market."

White said his team also learned a lot from the exchange that is helping the plant improve product quality. "The sister plant program has established synergy partnerships that are creating new value for our customers worldwide."

World-class safety

"You can't be world class in business without being world-class in safety."

That's the view of Dave Walline, Global Safety Leader for Composite Solutions. A safety professional who has been working for Owens Corning for 12 years, Walline recently re-focused his efforts to be sure the OCV businesses achieve the level of safety performance needed to be world class.

"It all starts with people knowing we care about them," explained Walline. "When people understand that we really do care, they become more engaged in the whole business process. It improves quality and productivity as well; they are all linked together."

> *"World-class safety enables us to deliver more value to our customers."*
>
> *Dave Walline, Global Safety Leader Composite Solutions*

Walline said safety has been a wonderful way to start conversations as the two businesses come together as one.

"It gives us a common language and a common perspective around something that is important to all of us," he continued. "We have already learned so much from each other by sharing our respective best practices."

Walline says the businesses are focused on four safety initiatives for 2008, but their main effort is on Lock-Tag-Try, a task-based lock-out process that helps ensure equipment won't start when anyone could be exposed to hazardous energy while performing production and maintenance activities.

He expects the benefits of these programs to make their way to customers.

"Customers won't be able see the accidents we prevented, of course, but they will notice and appreciate the engagement of our people and the consistent quality of our products. World-class safety enables us to deliver more value to our customers."

Conversion to Advantex® glass

OCV Reinforcements is also implementing plans to convert its batch-melting furnaces to Advantex® glass, a boron-free formula that produces corrosion-resistant glass fibers.

The first plant to be converted was in Thimmapur, India. Plants in Spain, China and Italy are scheduled to begin their conversion in 2008.

"Advantex® glass is a very environmentally friendly material," said Foster. "By eliminating boron from the batch, we avoid the need to incinerate emissions, a process that uses energy and releases CO2 into the atmosphere. In addition, customers get a product with excellent corrosion resistance properties."

The material also provides a common technology platform around the globe, giving customers a uniform basis for glass fiber specification and offering the same products anywhere in the world.

"We understand our customers and provide the best products and services to meet their needs," said Stephane Guillon, Director, Marketing and New Business Development.

Introduced in 1997, Advantex® glass is both an E-CR glass and an E-glass, in accordance with ASTM D578. The glass was formulated to possess significantly improved resistance to the corrosive effects of acidic environments but field experience shows that the product actually performs well in any aqueous environment, including water and alkaline solutions. Advantex® glass products also have a higher softening-point temperature than traditional E-glass, an advantage for some applications.

"The Advantex® glass conversion includes state-of-the-art Advanced Glass Melting technology," added Foster. "AGM equipment was designed for Advantex® glass and is very efficient. Sustainability benefits include reduced overall energy use and emissions, and it has higher throughput that will increase capacity.

"We were very pleased with our ability to make the conversion at Thimmapur," added Foster. "The furnace there is running very well and shows that the technology of both companies is certainly compatible."

> *"Advantex® glass is a very environmentally friendly material. In addition, customers get a product with excellent corrosion resistance properties."*
>
> *Al Foster, Director, Strategy & Investment Composite Solutions*

Application Spotlight

Construction

New Non-Woven Product Lifts Flooring Performance

OCV Non-Woven Technologies has introduced a higher-performing veil product that strengthens laminate flooring enough to be used in commercial applications.

The new product is designed to help take laminate flooring to new performance levels in terms of both impact resistance (EN13329) and fire resistance (EN13501-1). The innovative glass fiber non-woven mat is impregnated with a special resin system that assures high product quality and straightforward processing at the pressing stage.

"This new product allows laminate flooring producers to increase their market penetration in the demanding contract market," said Russell Evans, Market Manager, OCV Non-Woven Technologies.

"The improved fire performance combined with improved impact resistance allows for laminate flooring to compete with traditional flooring products used in the contract market, such as vinyl and ceramic. This is the first time a glass veil is used in this application."

Evans said laminate flooring is growing rapidly in the contract segment - currently only 20 percent of the market - and represents high growth potential for laminate producers.

For impregnation of the glass non-woven, OCV Non-Woven Technologies worked together with Hans Schmid KG, Gronau, Germany, a widely recognized specialty impregnator. Owens Corning and Hans Schmid previously developed a highly fire resistant core material for high pressure laminates (HPL).

Meeting the Concrete Industry

OCV Reinforcements participated in its first World of Concrete trade show in Las Vegas, Nev., U.S., in January and attendees had good things to say about the company's alkali-resistant (AR) Glass reinforcing fibers used in ready mixed and other concrete products.

"Our main focus during the show was on Cem-FIL®, the brand name for our AR fiberglass," said James Patterson, Cem-FIL sales manager for North America. "We also showed our glass fiber dispenser or fiber chopper for ready mixed concrete production plants."

AR glass can be used in most cement-based products because of its resistance to attack from the alkalis and sulfates that are commonly found in cement-based materials. AR glass is used in glass-fiber reinforced concrete (GFRC) products such as thin concrete panels, building facades and many architectural pre-cast products as well as in most ready mixed concrete applications.

OCV Reinforcements specialty AR glass is used in glass-fiber reinforced concrete

A full-size locomotive pulls 26 heavy axle-loaded coal cars 30 feet without incident

Infrastructure

Composite Railroad Bridge Passes Live Load Test

The world's first composite railroad bridge recently passed its first live-load test as a full-size locomotive pulling 26 heavy axle-load coal cars traversed the 30-foot span without incident.

The composite bridge was tested at the Transportation Technology Center near Pueblo, Colo. U.S., a research and testing facility operated by a subsidiary of the Association of American Railroads. The span was designed by John Hillman, Senior Associate with Teng & Associates, Chicago, Ill., U.S., as well as founder and President of HC Bridge Company, LLC.

"I've always been fascinated by the simplicity and elegance of the load paths in arch structures," said Hillman. "When I was introduced to Vacuum Assisted Resin Transfer Molding (VARTM) for composite manufacturing, it seemed logical to me to combine this versatility with the strength and economy of conventional building materials, yet still benefit from the lightweight and corrosion resistant nature of composite materials."

With this in mind, Hillman set out in the mid-1990s to design and build a lighter yet more durable bridge structure. Today, known as the Hillman-Composite Beam, or HCB, the bridge beams are designed to be stronger, lighter and more corrosion resistant than the standard concrete and steel beams traditionally used in infrastructure applications.

After patenting the concept, Hillman turned to the University of Delaware - Center for Composite Materials (UD-CCM) for support in fabrication and structural validation of the beam. Several industrial partners supported the project including OCV Reinforcements, which provided its Advantex® Flow-Tex™ quad-weave reinforcement material; Ashland Specialty Chemicals supplied Derakane Momentum resins; the Elliott Company, polyiso foam; and Hardwire LLC, steel reinforcements.

Plans are in place for the technology to be tested on two highway bridges this year - a 58-foot span in Illinois and a 36-foot span in New Jersey.

Consumer

BMC Selected for Appliance Handle

The first commercial application of an innovative gas-assisted injection molding technology for thermoset bulk-molding compound will be used by GE Appliances on its Profile series high-end side-by-side refrigerators.

BMC was selected for the part - a 42-inch (106.7 cm) long refrigerator handle - because of its aesthetics and stiffness properties. The part is molded using gas-assisted injection molding (GAIM) technology that permits the production of parts with hollow cross sections - previously not possible with BMC.

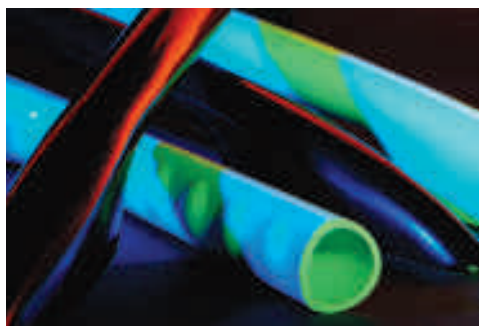
"Rigidity for a part of this type and length creates implied value with the consumer since it gives the feel similar to a steel handle," said Len Nunnery, Vice President, global sales and marketing at BMCI, a major compounder. "In addition, the gloss finish creates a high quality impression."

Due to the hollow cross section provided by the GAIM technology, the part is less expensive than a traditional solid BMC part.

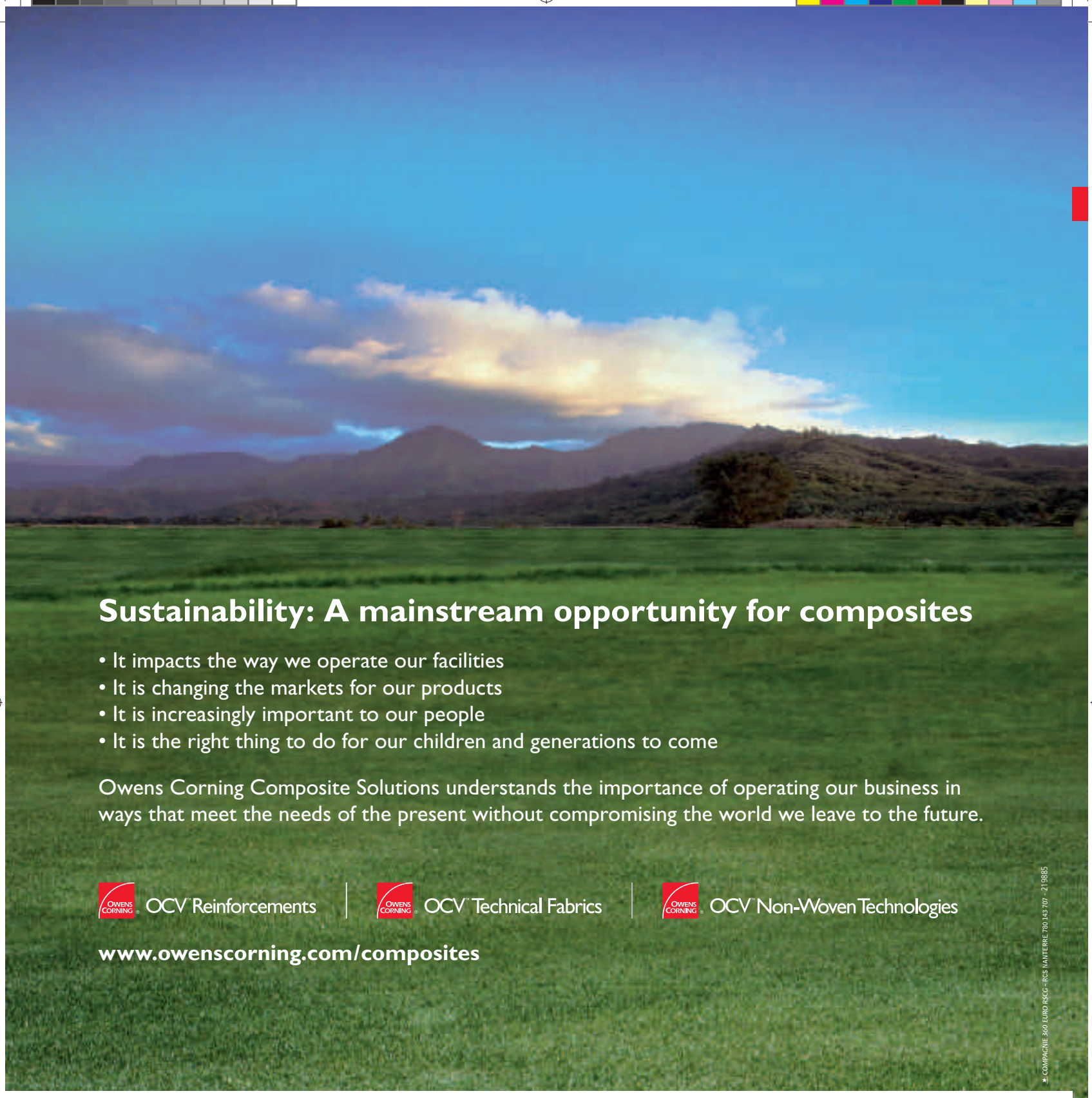
Nunnery said interest in BMC as a material solution is increasing. "The material's ability to hold extremely tight tolerances has allowed it to replace die-cast aluminum in automotive throttle bodies marketed by Bosch in the U.S. The BMC part is half the cost of its metal counterpart. That kind of performance also has prompted interest among Japanese automakers."

Other applications under development for the appliance and automotive markets have the potential for significant volume as well as the ability to change the way engineers view the material.

"BMC has been an underutilized material, given its performance benefits such as lighter weight, improved strength, design and manufacturing flexibility and most importantly, reduced cost," said John Giacalone, Business Manager, OCV Reinforcements. "These developments provide new growth for BMC and composite materials."



The handle has a gloss finish and a feel similar to steel



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