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for composite solutions

MARCH 2012

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EDITORIAL

WATER FOR THE WORLD



Drinking water is becoming an increasingly precious resource as the world population continues to grow. The global water sector is \$450 billion today and continues to grow at a rate of 4-6 percent. In developing markets, especially China and India, water treatment systems are being built driving growth of 8 to 10 percent¹.

In 2010, more than 1 million metric tons of composite applications were used in this market. Today consumption is highest in the EMEA region with high growth rates in Asia and Latin America*. Demanding corrosion-resistance requirements are leading growth especially for pollution control equipment, chemical processing, desalination plants and a variety of saltwater marine applications including tidal energy installations.

We work closely with our customers in this market to understand and meet their needs. As the global leader in glass reinforcements, we recognize the importance the composite industry can have in meeting some of these pressing water challenges with cost effective, sustainable solutions. They deal with either corrosion resistance, higher performance curing capabilities for in situ pipe relining and maintenance, or the capability to withstand salt and currents in moving large volumes of ocean water.

Owens Corning teams are continuously looking for technical solutions that will provide the right, valuable and useful answers to the water collection, transportation and equipment maintenance issues I have described, and the many other opportunities that impact the planet and its people.

The glass reinforcement industry must not only be a solutions provider, but also operate itself in the most sustainable fashion by not contributing to the planet's pressure for energy or other resource intensity. Owens Corning has set a corporate goal to reduce water intensity in its operations by 35 percent from 2010 to 2020. This will be achieved through greater water efficiency activities including recycling technology. We are already well on our way towards that goal. This is a record for which I am proud, and one we intend to continue to build upon in the coming years.

The world's water resources will become increasingly scarce in a number of locations. The composites industry can deliver solutions that make access to water easier and reduce waste, hence contributing to a multitude of health, safety, environmental and economic benefits.

Sincerely,
Arnaud Genis
Group President
Owens Corning Composite Solutions Business

FIGURES ARE TELLING

- While **water** covers the majority of our planet, 97 percent is saltwater and 2 percent is in the form of ice and snow. Less than 1 percent can be used for drinking, irrigation and industrial cooling.¹
- Currently, 1.1 billion people lack access to safe drinking water. By **2025**, an estimated **5.5 billion people** will live in areas facing moderate to severe water stress².
- The tank weight of the Three Gorges Dam, China will divert the axis of rotation of the earth by about 2.5 cm¹ while its construction needed 27 million m³ of concrete³.
- More than **60 billion liters of water** are produced each day from 14,450 desal plants in the world¹.
- More than **80 percent** of the sewage in developing countries goes **untreated, polluting** rivers, lakes and coasts⁴.
- It is estimated that 15 to 20 percent of all water running through pipes in developed countries is ultimately **lost due to leaks**⁵.
- In 2009, the cost of one cubic meter of water per user per municipality ranked from 0-0.07 € in Kuala Lumpur, Malaysia to 1.4-2.6 € in Gand, Belgium¹ including local cost of infrastructure, operating and cleaning water.

¹ Translated from National Geographic April 2010 French edition; Global Water Intelligence

² 2030 Water Resources Group

³ Three Gorges Dam Project - Quick Facts ibiblio.org.

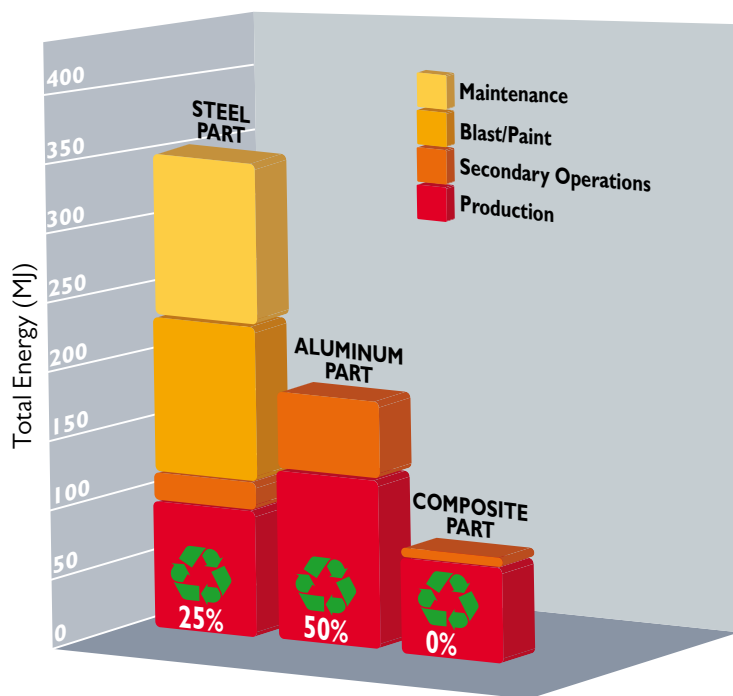
⁴ Hands Across The Nations - <http://www.hatn.org/water:htm>

⁵ North America | United States - Global Water Sector (Citi) - 24 May 2011

* 2010 Owens Corning proprietary database

Composites offer sustainable advantages over metal

Sustainability is a topic which is rapidly gaining global traction. Sustainable advantages can be found in many industries including composites.



Composite have lowest Energy impact despite having no recycled content

While traditional materials such as steel and aluminum offer recycled content and recyclability, glass fiber composites can offer other green qualities. In many cases composites are proven to surpass the environmental friendliness of other materials over their lifespan.

A life cycle assessment (LCA) considers the environmental impact of a product from cradle to grave. This concept encompasses harvesting raw materials, manufacturing the product, all transportation efforts, end use application utilization and disposal.

When a product is truly sustainable, there is a balance between economic, human and environmental factors which allows for production of a profitable product which meets market needs without depleting essential resources for future generations.

Owens Corning has assessed more than 30 applications over the past five years including composite applications such as glass fiber reinforced concrete and composite platforms.

In 2010 Owens Corning performed a LCA for Strongwell's industrial platforms. Despite having no recycled content, the composite parts had the lowest overall energy impact when compared to identical metal parts. (see chart)

The LCA showed that composite platforms performed better than both steel and aluminum in nine of the 13 traditional sustainability categories. Composite platforms had advantages in the following categories: global warming, acidification, carcinogenics, ozone depletion, aquatic ecotoxicity, smog, waste to landfill, metered water, and energy.

For example, the reduced weight of a composite factors into its energy consumption. The composite parts in the assessment were 1.2 times lighter than aluminum counterparts and 3.5 times lighter than steel parts.

Because composites weigh less, **“you can make more parts out of a kilogram of composites than you can out of a kilogram of steel. Therefore, it is critical to compare the environmental impact by parts, not by weight,”** said Gary Jakubcin, manager of green products and life cycle assessment at Owens Corning.

The production and fabrication of composites often utilizes less energy than metals and because composites weigh less, the amount of energy used during transportation is also reduced.

For more information on how composites can magnify your company's sustainability efforts, be sure to attend Owens Corning's sustainability presentation at the JEC.

Additional information can be found at <http://sustainability.owenscorning.com/>



Sambark LFT Enters New Global Markets

Long-fiber thermoplastics (LFT) are a reliable technology that provides impact, creep and long- and short-term heat resistance compared to short fibers. Because it is light weight, this technology is being used more and more, making it a viable replacement for metal in composite applications used industries such as automotive and electronics.

Sambark LFT Co., Ltd, Korea, Asan, is working to transform the world with advanced solutions and improved energy efficiency by replacing metals with LFT. Established in 2000, the company was among the first to develop LFT in Korea. "Owens Corning is a good partner for us," said Ho Gab Joeng, Sambark LFT CEO.

"The team is always ready to do what is required to satisfy our needs and support our growth," said Joeng.

As weight reduction becomes increasingly important for energy efficiency, Sambark expects to see the use of LFT grow in automotive and electric and electronic applications globally. "We see Sambark's passion to transform the market and see the potential for growth in the use of LFT," said SJ Moon, Owens Corning are sales manager.

"Our vision for the future is to have the largest market share in the world by 2018," said Joeng. "We are happy that Owens Corning is helping us to realize our vision."

"The company's SE4121 single-end roving for polypropylene LFT works well in our processes and provides the mechanical properties we require."

Sambark is now expanding its business globally to supply in the U.S. and China and Owens Corning supports its growth. Joeng added, "Many Korean manufacturers are becoming global companies. Global support is important and Owens Corning has demonstrated that it can supply the product with consistent quality and service outside Korea."

Owens Corning has worked closely with the company to ensure its product works in Sambark's processes.

**For more information
about Sambark LFT Co., Ltd.,
please contact sbkim@lottechem.com**

Owens Corning expands non-woven solutions to India battery makers



Retainer mat is a glass veil which can enhance the lifetime of lead-acid batteries. During the last two years, Owens Corning expanded its global non-woven offering to better serve customers in India with its Advantex® E-CR glass mat solution.

Because India is the largest glass retainer mat market in the world, the recent expansion in local technical support and appropriate solutions was critical in helping Owens Corning support rapidly growing demand in Asia.

“India is a good market for both large battery manufacturers and a lot of small producers and it’s very important for them to have fast local service,”

said Ralph Jousten, global market segment leader E&E– Battery Solutions at Owens Corning Vehicle Components Business.

Owens Corning retainer mat helps reduce shedding of active material and increase battery life time through improved cycling ability, deep discharge ability and vibration resistance. Also it resists highly concentrated sulfuric acid in highly oxidative environment, even at high temperatures.

In addition to using retainer mat to enhance typical battery applications in trucks, defense vehicles, busses and taxis, the material is used in car batteries and household batteries which offer reliable energy during power cuts. The Indian climate factors into the importance of retainer mat as a hot climate greatly decreases the lifetime of a battery. However, the use of glass mat is a very effective way to reduce disintegration of the battery plates at a very reasonable cost.

Owens Corning has been manufacturing retainer mat for lead-acid batteries since the early 1980’s and now supplies customers in North America, Europe and Asia. Its consistent global solutions provide differentiating benefits to the users.

“There are all sorts of trace metals that are detrimental to performance. We have high specification standards which result in the use of high quality elements in our products,” said Jousten.

For more about Owens Corning retainer mat, contact Ralph.Jousten@owenscorning.com

Owens Corning's Advantex[®] glass used to reinforce the National September 11 Memorial Fountains

The recent unveiling of the National September 11 Memorial Fountains at New York City's World Trade Center marked the tenth anniversary of those who lost their lives in one of the United States worst tragedies.

In 2005, the National September 11 Memorial & Museum at the World Trade Center Foundation was set-up to oversee construction of a memorial on the site of the twin towers. The Foundation opened a worldwide design competition and received more than 5,000 submissions from 63 countries.

The winning design, entitled "Reflecting Absence," is an eight-acre plaza with 400 trees that surround two massive reflecting pools. The challenge was to keep 600,000 gallons (+/-2,270 m³) of water in each pool flowing and sparkling throughout the year.

Before the first section of pipe and fittings were wound for this project, there were approximately three years of design and engineering efforts by Industrial Fiberglass Specialties, USA. Working with the Memorial Fountain architects and specification team, Industrial Fiberglass Specialties provided guide specifications for the quality and performance standards needed in a fire resistant FRP composite piping system.

“The FRP composite materials were specifically selected because they are corrosion resistant, 33% lighter than steel and were precisely engineered to bolt together quickly finished spoils.”

Industrial Fiberglass Specialties is a full-service provider of FRP composites.



Industrial Fiberglass Specialties provided 4,300 linear feet (+/-1300 m) of 12" and 16" diameter (+/-30 to 40 cm) FRP composite pipe for the project. The company also supplied their own field service teams to assist in the final connections and inspection of the pipe system.

Industrial Fiberglass Specialties FRP composite pipe is designed to handle corrosive water treatment chemicals that might react with some metal alloys. The interior liner, structural wall and exterior fire retardant reinforcements were all made with Advantex[®] glass. Industrial Fiberglass Specialties is a long time user of glass reinforcements from Owens Corning.

"Advantex[®] glass, a boron-free E&E-CR glass reinforcement, is an excellent product for corrosive applications and environments," said David Dean, vice president new business development, Industrial Fiberglass Specialties.



For more information please visit

www.ifs-frp.com

and <http://composites.owenscorning.com/aboutAdvantex.aspx?source=marketvision>

Master Spas aspires to make the world more comfortable

Master Spas, Inc., manufactures high-end hot tubs and swim spas including a Signature line endorsed by Olympic swimmer and gold medalist, Michael Phelps. Manufacturing the larger spas presents unique challenges. To manufacture its larger, more intricate spas, Owens Corning has met the company's unexpected needs with multiple solutions.

The Fort Wayne, Ind., company uses an exclusive propulsion system that required a glass fiber reinforcement to accommodate the large cuts necessary. Structural integrity, volume capacity and hydraulic stress were manufacturing challenges.

“They found the solution in Owens Corning's Advantex® gun rovings which provide a structurally sound and completely sealed laminate thanks to its unique wet out properties.”

The swim spas can be up to 20 feet in length and hold more than 2,000 gallons of water. A watertight and structurally sound acrylic and fiberglass laminate is critical to the longevity of the luxury units and their performance, especially for flexural strength along vertical body sides. Master Spas chose Advantex® chopped strand mat because it proved to be the easiest and most reliable for assembly operators to work with in the manufacturing process.

Another critical step in the assembly process is insulating and protecting the pumps, plumbing and control equipment beneath the spa. FOAMULAR® Fanfold supplied by Owens Corning's Building Materials Group proved to be the solution. The Fanfold material protects these components from the foam. “The Fanfold has a very clean look and is easier to work with than other products we've tried,” said Michael Rees, director of manufacturing at Master Spas.

Making the world more comfortable is one of Master Spa's goals. The sophisticated designs, unique shapes, award-winning performance and long-lasting products are all made possible with the use of Owens Corning's exclusive materials in the company's advanced mold composite techniques.



**For more information please visit.
www.masterspas.com**

and <http://composites.owenscorning.com/aboutAdvantex.aspx?source=marketvision>



Revolutionary Gridshell Built from Composite Materials

Using composite materials in structural elements is rare. Generally, they are constructed using solutions that have been used for years.

However this changed, when a group of people conceptualized and realized an innovative architectural structure that illustrates the use of composite materials and Owens Corning's Advantex® glass fiber in slender civil engineering. This group was comprised of six students from Ecole des Ponts ParisTech, Top Glass, an Italian pultruder, Laboratoire Navier, a French lab, Viry, an engineering firm and T.E.S.S., a design agency.

This project was born from the need for a structure that could host conferences and speeches during a solidarity festival, Solidays, held in Paris in June 2011. This technique is known as "gridshell", which utilizes a light structure with the shape and strength of a double curvature shell that is made with grid instead of a solid surface.

Gridshells can be made from a variety of materials including steel, aluminum or wood. These structures can have a large span with very few materials and are normally made with bent tubes joined together by connecting nuts. What makes

the gridshell for the Solidays festival unique is that it is made of glass tubes reinforced with Owens Corning's Advantex® Type 30® glass.

"Composite gridshells present many advantages including ease of building, low ratio of material per square meter to take out external loads, flexibility for shaping and design, strength, lightness and stiffness," said Jean François Caron, R&D director of Laboratoire Navier, Ecole des Ponts ParisTech.

The composite tubes were pultruded by Top Glass S.p.A. Filippo Bertocchi, sales manager at Top Glass explained, "As the stresses in the beams are almost exclusively axial stresses, fibers are required mainly lengthwise. Therefore, the pultrusion industrial process provides a cost-effective method for the production of longitudinal highly stressed composites."

"Composite gridshells have great potential in complex architectural shapes or highly corrosive environments where they perform well compared to galvanized or stainless steel products," added Pr. Caron. "Thus, it provides a flexible, secure, and cost efficient option for users."

For more information, visit <http://navier.enpc.fr/Materiaux-et-Structures?lang=en>



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OWENS CORNING COMPOSITE MATERIALS, LLC
ONE OWENS CORNING PARKWAY
TOLEDO, OHIO, USA 43659

1-800-GET-PINK™
www.owenscorning.com

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Executive Editor: Carmelo Carrubba
carmelo.carrubba@owenscorning.com

Managing Editor: Emmanuelle Mangelot
emmanuelle.mangelot@owenscorning.com

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