



MARKET

for composite solutions

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VISION



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Opportunities for Dynamic Growth

EDITORIAL

THE CASE FOR COMPOSITES GROWTH IN 2015



Profitable growth is the aspiration of every world-class enterprise. Growth enables us to capture the value and opportunities that advance our business and help ensure that we achieve the goals of our customers, our company, and our shareholders.

Of course, growth does not occur without the right market environment, the right strategy, and the right capabilities. As we near the end of the first quarter of 2015, it is clear that very real opportunities exist for growth in the composites industry this year and beyond.

From a macro perspective, global industrial production, a key indicator for composites growth, is expected to grow by approximately three percent this year. This will translate to another year of healthy growth for our industry – if we are prepared to take advantage of it.

At Owens Corning, we are focused on doing just that. We are leveraging our strong core capabilities, Product Leadership expertise and customer relationships to drive growth. Over the past several years, we have worked hard to solidify our core by strengthening our world-class manufacturing capability and resources; our global science and technology network; an outstanding commercial organization; and collaborative relationships with the industry's best customers.

We define Product Leadership as the development and delivery of differentiated products that boost the profits of our customers through enhanced productivity and performance benefits. This year, our Composites team expects to launch more than 20 new products, reflecting the growing impact of our ambitious Product Leadership agenda. And we have established a "Product Vitality Index" that will enable us to track the value captured from our new products relative to the revenues generated by our entire product portfolio.

Speaking of growth, I am also excited to share that our new, state-of-the-art glass non-wovens facility in Gastonia, N.C., USA, is on track to begin production later this year. This 200,000 sq. ft. facility will primarily support the building materials sector with glass non-woven products serving the gypsum, ceiling, flooring, and insulation markets.

This issue of Market Vision features a number of stories that illustrate how Product Leadership and customer collaboration are already leading to exciting growth opportunities for our company and our customers alike. I hope that you will enjoy reading about how our team is engaging with customers to provide new and differentiated solutions to drive continued growth in our industry.

We invite you to meet our team and learn more about these and other product innovations up close at JEC Europe 2015, which will take place from March 10-12 in Paris, France. Those of you who join us will be greeted by an inviting, all-digital booth presence and a talented team that is excited about working with you to deliver performance and grow together in 2015 and beyond!

Sincerely,

Arnaud Genis
Group President,
Owens Corning Composite Solutions Business

TeleStrand™ high-performance glass fiber solutions help India communicate faster

A new product platform supports the demanding needs of the Indian market for optical fiber cables in major growth areas such as broadband internet access, mobile connectivity and e-governance, benefiting the country's "Digital India" initiative.

Using Owens Corning's inline technology for impregnated glass fiber reinforcement materials, TeleStrand™ 3000 is a high-quality and ready-to-use roving solution for peripheral strength members in optical fiber cables (OFC). It is ideally coupled in the OFC assembly with high-speed pultruded, UV or non-UV cured central strength members, typically featuring a glass fiber content of up to 85 percent. In the UV-cured application segment, TeleStrand™ 2000 UV series is a single-end roving purpose-designed for central strength members and already meets the customized needs of the Indian telecom industry.

“Our new TeleStrand™ solution platform has a perfect market fit in the whole value chain of India's fast growing optical fiber cable industry”

says Gokul Venkataraman, Strategic Marketing Leader, Owens Corning India. In the Indian telecom market alone, Owens Corning estimates the demand for composites to rise at a compound annual growth rate (CAGR) of approximately 17 percent by 2017.

Differentiating processing advantages

Both products help superior processing and the use of Advantex® E-CR glass ensures excellent water resistance. TeleStrand™ 2000 UV series is supplied in bobbins which match OF cable lengths thereby avoiding splicing and yielding high productivity. Processing advantages such as strand integrity and tight LOI control, fast impregnation and a significantly reduced level of fuzz (< 0.002 gm/lb of product) in high-speed pultrusion lines minimizes downtime and

production waste. TeleStrand™ 3000 product is "Made in India" for India and with its 4mm strand width delivers a strong and more pliable peripheral sheath which facilitates cable unwinding/laying. Available in metered length bobbins of 8.4, 10.5 and 12.6 kilometers it reduces cable waste during installation. Its high-quality coating is applied directly on the filament in the primary process and enhances rodent protection.

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New PUR composite window lineals for better energy conservation

The burgeoning building and construction industry in China makes it the world's largest market for windows – around 36 percent of global manufacturing output at present.

Windows play essential roles in determining the overall energy profile of residential and other buildings where the efficiency, durability and maintenance of lineals is a key factor. To help meet stricter regulations in China¹, Shanghai-based Collodin, which specializes in building insulation solutions, teamed up with Owens Corning and Huntsman Polyurethanes to improve the energy efficiency of its window lineals by fully exploiting PUR pultrusion technology.

Extraordinary mechanical properties²

Dr. Yan Huang, Project Director at Collodin said the new PUR composite window lineal system has exceptional flexural strength - up to 50 times greater than PVC, 6 times better when compared to aluminum alloy and 3 to 4 times that of unsaturated polyester (UPE) composite profiles.

“In addition, when comparing the coefficient of thermal expansion, the new profiles expand 10 times less vs. PVC, 3 times less than aluminum alloy and 12 percent less than UPE composite profiles” he added.

Their abrasion resistance and superior toughness show little or no micro-cracking during subsequent assembly operations such as cutting, machining and drilling for screw-fixed fittings such as handles. The optimized glass fiber reinforcement developed by Owens Corning displays high mechanical properties even in

unidirectional sections. This eliminates the need for additional steel stiffeners like those usually found in other thermoset (TS) and aluminum profiles, which act as thermal bridges, thereby affecting insulation properties.

Time-saving processing advantages and value-added design

Faster curing time means PU composite pultrusion has advantages over other TS resins and is also more energy-efficient than PVC and aluminum extrusion processing. The non-foamed, full-density PUR composite lineal from Collodin is made with traditional composite processes with a glass content tailored to provide a thinner and lighter, yet complex cross-section design. The trio of companies' expertise resulted in developing a new GFR PU resin composite lineal system which helps offer windows excellent thermal properties.

¹ 2th Five-Year Comprehensive Work plan for Energy Conservation and Emission Reduction, September 7, 2011.

² Mechanical and Thermal Properties, comparative data. Source: Shanghai Collodin Material Scientific & Technological, 2014 and Huntsman Polyurethanes, MI USA 2014.



Game-changing PulStrand™ solutions for optimal processing performance

percent², less part bowing and deformation and excellent humidity resistance.

Wider application potential

In addition, the sizing also allows for increased glass content (higher modulus) and helps to improve the flexural, shear and compressive strength of composite products. Tests have highlighted an increase of up to 57 percent³ flexural strength. Combining these characteristics with the outstanding corrosion resistance provided by Advantex® E-CR glass, the PulStrand™ 4100 product is specially designed to optimize the durability and service life of applications in corrosive environments.

“Our new PulStrand™ 4100 product has the potential to help improve the profitability of our customers and gives a more durable, stronger product for demanding markets” says Bryan Minges,

Global Product Manager, Owens Corning. The PulStrand™ 4100 product covers a wide tex range (600-9600) and can be customized to specific application requirements allowing for the production of profiles for the consumer, recreation, corrosion, electrical, transportation and construction markets. Commercially available worldwide, the PulStrand™ 4100 product is manufactured to the same high standards of quality and consistency at plants in North America, Europe and China.

The global composites market for pultrusion continues to grow requiring higher performing and more competitive solutions. The New PulStrand™ 4100 product delivers significant advantages and performance benefits in relation to existing competitive rovings.

Manufactured using Owens Corning's proprietary Type 30® roving technology, the PulStrand™ 4100 product offers superior processability, strength and fatigue resistance in a multi-compatible product for polyester, vinyl ester, epoxy and polyurethane resin systems. This higher-productivity material provides faster line speeds while reducing downtime, scrap and labor as well as enhancing the modulus and durability of pultruded profiles.

Enhanced productivity

Key to the higher processing performance of the PulStrand™ 4100 product is its sizing chemistry. This ensures excellent resin-to-glass adhesion and fast, uniform wet-out - more than 50 percent when compared to existing products¹. Further extensive benchmark tests of competitive products have also shown a reduction of fuzz formation of up to 92



¹ Owens Corning internal wet-out comparative test using 4400 texType 30® product in polyester resin.

² Tested according to Owens Corning internal fuzz test method.

³ Test results of a leading pultruder using 4400 texType 30® product in polyester resin.

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Composites provide typhoon resistant and long-life utility poles

China is hit by typhoons every summer, normally affecting its eastern and southern regions. Last year, a subsidiary of the China Southern Power Grid Company embarked on the rebuilding of power transmission utility poles along 20 kilometers of coastline exposed to grade 12 and grade 13 typhoons.

China is currently in the second stage of its smart grid deployment. The project, lasting from 2011-2015, includes key areas such as transmission and distribution covering all voltage levels. Investing is good, however maintenance is crucial. This is why the China Southern Power Grid Company decided to replace conventional, steel-reinforced concrete poles with poles made of lighter, advanced composite material – especially in areas that are more exposed or difficult to access. The market for the replacement of steel reinforced concrete poles is potentially huge, with literally thousands of kilometers needing upgrading.

80 percent lighter yet 4 times stronger

The new composite poles are manufactured by Dinglicheng Composites Co., Ltd., by a filament winding process using a high-performance glass combined with polyurethane (PU) resin and are primarily used for 110-220kV transmission and 10kV distribution lines.

According to engineers from Guandong, the composite poles are over 80 percent lighter than steel reinforced concrete ones, yet possess a compressive yield strength and load-bearing capacity 4 times higher – up to 200MPa.

Service life of up to 80 years

In comparison with steel and concrete, the new advanced and corrosion resistant composite utility poles have a service life of up to 8 decades. And, even compared with poles made with conventional E-glass, they offer a higher modulus and longer fatigue life given the same weight and are far more corrosion resistant making them ideal for exposed shoreline use.

“ Their strength allows them to be spaced further apart - more than double that of conventional concrete reinforced poles thereby offering infrastructure costs savings by lowering the number of poles per kilometer, ”

says Guansheng Hu, CEO, Dinglicheng Composites Co., Ltd. Their inherent electrical insulation decreases ground-fault arcing and resists lightning. Incorporating composite cross-arms and insulators reduces flashover accidents.

¹ <http://www.navigantresearch.com/research/smart-grid-in-china>



Photo: Pict courtesy of Dinglicheng Composites, China

In 2014, Dinglicheng's new poles were certified by the China Southern Power Grid Company and in six months alone almost a thousand had been installed.

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SMC Technology for Structural Composites in Automotive Light-Weighting

© Pictures courtesy of Time Technoplast.

Vehicle light-weighting is the answer for the automotive industry to meet the strict regulatory constraints on fuel consumption and carbon emissions worldwide. For example, to achieve European CO₂ emission targets (95 g/km) by 2020, 200 to 300 kg weight-reduction per vehicle is required.

The composites industry is in the unique position to deliver alternate innovative material solutions for advanced technologies that will not just reduce weight, as some metals do, but open a wider design window for part consolidation, integration of functions and enhanced mechanical performance over existing structures.

Significantly higher strength and stiffness

“ Owens Corning is developing a portfolio of new glass fiber based reinforcements for both thermoplastic and thermoset process technologies to support the light-weighting trend. These new products will significantly improve strength and stiffness offered by conventional solutions ”

says Hans van der Steen, Owens Corning Business Development Leader for Structural Composites. Target automotive applications include floor and body panels, suspension systems, crash beams and seat structures, he added. Sheet Molding Compounds (SMC) have a proven fit in the manufacture of large and complex parts at affordable cost, while providing the specific creep, fatigue, thermal, static and crash performance for structural applications in automobiles. Partnering with leading fabricators, Owens Corning facilitates the development of high performing



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SMC solutions, which aim to boost mechanical performance and thus reduce weight.

25 percent part weight reduction opportunities compared to steel

New Advantex® MEI510 multi-end roving is designed for epoxy SMC material systems for structural composites in automotive applications. Conceived for SMC low-VOC¹ emissions, key benefits of MEI510 are fast impregnation and excellent processability without compromising surface aesthetics. It also allows a glass content of up to 60 percent² and beyond for stronger and lighter components while maintaining design freedom thereby providing significant (25 percent)³ part weight reduction opportunities compared to steel. These significant productivity gains provide the momentum needed to speed the successful penetration and adoption of SMC structural composites for effective metal replacement in the automotive industry.

¹ Volatile Organic Compound

² Owens Corning lab test, Besana, It, Nov.2012, Epoxy material system

³ Owens Corning SMC Technical Cost Modelling analysis, 2013; versus steel without taking into account potential function integration vs metal solutions

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Surfacing Non-Wovens for GRP¹ Laminates in a 40+ product portfolio

FILAMENT WINDING

PULTRUSION

flat GRP panels
continuous lamination

HAND LAY-UP

RESIN TRANSFER MOLDING AND RESIN INFUSION

Owens Corning is a leader in Non-Woven Technologies and these high, value-added key components for composites are available worldwide.

Our Advantex[®] E-CR corrosion resistant glass wet-use products or C-glass dry use products for surfacing non-wovens for GRP laminates add value both in terms of structure as reinforcement and also as a corrosion barrier. Their smooth surface and opacity make them aesthetically pleasing.

Serving five key manufacturing processes and multiple applications

The closed or open structure of both our E-CR glass and C-glass non-wovens, combined with a wide range of available weights (21 to 300g/m²) and roll widths (0.035 to 4.15m), conform to multiple resin uses and applications. Several binder technologies (some of which are unique, proprietary procedures) and several fiber diameters make for easy integration into a range of key manufacturing processes. These include filament winding, pultrusion, panel continuous lamination together with closed mold hand lay-up and resin transfer molding and infusion.

Brochure available at
composites.owenscorning.com

Versatile benefits with huge market potential

E-CR glass non-woven veils strengthen the resin-rich corrosion barrier; create a strong bond with the underlying laminate and enhance surface appearance by masking the reinforcing fiber pattern. They also isolate the structural fibers from exposure to abrasion and corrosion, contributing to the structural integrity of the total composite. C-glass long fiber based non-woven veils provide excellent wet-out capability and conformability. Thicker non-woven glass mats can be applied as core layer which increase the stiffness of the laminate and help to reduce weight and resin consumption.

“This unparalleled range of characteristics makes the future of surfacing non-wovens appear bright, with tremendous opportunities in key markets such automotive, building and construction, transportation, infrastructure and consumer goods industries,”

says Stuart Fox,
Market Manager GRP Non-Wovens,
Owens Corning.

¹ Glass Reinforced Polymer

PRODUCT LIST

Product Nomenclature	Styrene Solubility	Fibre Type	Fibre Ø (micr.)	Binder %	Mat Weight (g/m ² /oz/ft ²)	Thickness (mm/in)	Roll Width
CONTINUOUS PROCESSES							
FILAMENT WINDING							

Owens Corning, March 2015



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