

Growth Opportunities in Global Composites Industry, 2012 – 2017

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Today's Agenda

- Executive Summary
- Composites Market Analysis
- Opportunity in Automotive Market
- Growth Opportunities in 2012 and Beyond
- Conclusions
- About Lucintel





Executive Summary

- Global composite materials industry reached \$19.6B in 2011, marking an annual increase of 8.2% from 2010, and driven by recovering of majority of markets
- Market value of end use products made with composites was \$55.6B in 2011
- North American composites industry accelerated by ~ 9 % in 2011, Europe increased by ~ 8% while Asia grew by ~ 7% in 2011
- By 2017, composite materials industry is expected to reach \$ 29.9B (~ 7% CAGR) while end products made with composite materials market value is expected to reach \$85B
- Global Automotive composite materials market was estimated to be around \$ 2.8 B in 2011, and is forecast to reach \$ 4.3 B by 2017 @ CAGR of approx. 7%
- Significant interest by Automotive OEMs in carbon fiber applications
- Population growth, new infrastructure projects, urbanization, increase in middle class population, and the green movement will drive composites growth to new horizons in emerging economies.



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Composites Penetration in Various Market Segments – largest markets, including Transportation, have the lowest penetration





Regional Composites Market Trend: 2006-2011





Key Insights

- Composites industry has seen large fluctuations in various markets during the last 5 years due to economic recession
- Composites industry performed poorly compared to GDP during the last 5 years, however the composites industry is forecast to grow at a higher rate than GDP over the next 5 years



As developing countries play a larger role in the global economy, their presence in composites manufacturing is also increasing



Key Insights

- Developing nations (defined as BRIC) have substantially increased their participation in the global economy
- Developing nations overall have taken a strong role in global composites production
 Further BRIC increases are not a
 - matter of whether they will happen,
 - but when and by how much



Market potential in various countries in 2011 – developed countries have a much larger composite consumption per capita



Note: Bubble size represents total composites consumption in respective countries





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Composites in Automotive

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Body Panels/ Parts	Key Composites Materials	Key Manufacturing Processes	Key Insights
Interior Headliners	Polyurethane, LWRT	RIM, Injection molding	Global Automotive composites material market was worth \$ 2.8 B in 2011
Air Intake Manifold	SFT	Injection molding	Glass-fiber-reinforced polymer composites
Front End Carriers	LFT, SMC	Injection molding, Compression Molding	(SMC, GMT, etc.) are cost effective in volume around 100K per annum due to low tooling cost
Bumper Beams	GMT, SMC, Polyurethane	Injection molding, Compression Molding, RIM	 High cost of materials and lack of suitable manufacturing processes for high volume applications continue to be limiting factors for
Fenders	SMC, LCM	Compression Molding	 Carbon fiber usage will remain limited to high
Hoods	SMC, LCM	Compression Molding	end & premium segment cars
Chassis	Roof	Applications	 Advent of lower cost carbon fiber could open a new era for composites in high-volume applications Front Bumper Leaf Spring
	Koor		
Constant"	+ +	Creating the Equat	ion for Growth 🛛 📈 Lucintel

Weight savings, fuel economy and other performance benefits will lead to the growth of composite consumption in Automotive applications

Global Automotive Composite Materials Market (2011-17) in \$B





Air Intake Manifold



Instrument Panel

Drivers

•Light Weight: GFRP reduces fabricated part weight by 20-30% whereas CFRP can reduce by 40-60%

- •Excellent corrosion resistance
- •Superior fatigue strength
- Styling & system cost saving

Challenges

- High material cost
- Lack of efficient
- manufacturing process

Key Insight

- •EU has a significant share of composite usage in automotive applications, followed by the US
- Emerging economies from APAC & ROW will substantially drive composites usage in automotive applications in the future
 Global Automotive Composite Materials market is estimated to grow @ CAGR ~7% to 2017

H= High, M= Medium, L= Low



Price Performance Comparison of Competing Materials for Automotive Applications





Price Performance Comparison of Competing Materials for Automotive Applications





Emerging applications will be a driving factor in the growth of Composites in the Automotive Market

Application	OEM-Model	Composites Type	Driver for Use of Composites	Launch Year
Roof Compartment Cover, Trunk Lid	BMW M6 Convertible	Glass Composites	Weight Reduction	2013
Wheel Rims	Daimler Smart's Third- Generation Electric Drive	Glass Composites	Light Weight, Stunning Look	2012
Instrument Panel, Inner Door Modules	Land Rover – Evoque	Glass Composites	Light Weight & Fuel Economy	2011-12
Engine-mounted Oil-filter Module	Chrysler Pentastar Engines	Glass Composites	Thermal Requirements for Cooling-System Components	2010-11
Door Module	Faurecia's Jeep Liberty SUV	Glass Composites	Weight Reduction	2010
air-intake manifold system	General Motors V6 Engine	Glass Composites	Weight Saving , Better Acoustic Performance	2010
air-intake manifold system	Volkswagen Gasoline Engines	Glass Composites	Weight Saving , Better Acoustic Performance	2009-10
Fluid Filter Module	Daimler AGT- Mercedes	Glass Composites	38% Weight and 16% Cost Reductions	2009-10



Increased Interest in Carbon Fiber by Automotive OEMs will significantly drive the growth of the Composites Industry over the next 10 Years

Application	OEM-Model	Composites Type	Driver for Use of Composites	Launch Year
Composite Passenger Cell	BMW i3	Carbon Composites	Light Weight	2013
Car Roof	McLaren MP4-12C Spider	Carbon Composites	Light Weight	2013
Car Roof	BMW M6 Coupe	Carbon Composites	Light Weight	2012
Body Aerodynamics Kit	Callaway Corvette RPO B2K	Carbon Composites	Light Weight	2012
Cabin Frame, Floor Panel, Roof Pillars, Hood, Transmission Tunnel, and Rear Floor	Lexus LFA	Carbon Composites	Light Weight	2012
Body Aerodynamics Kit	Lamborghini Aventador LP700-4 LE-C	Carbon Composites	Light Weight	2012
Front and Rear Bumpers, Bumper Grilles, Side Skirts, and Mirror Covers	Lamborghini Aventador LP700-4	Carbon Composites	Light Weight	2012
Panels on Interior Door	Lamborghini Murcielago SP670-4 SV Twin Turbo	Carbon Composites	Light Weight, Stunning Look	2012
Front & Rear Fenders, Trunk Lid and Door Sills	Aston Martin V12 Zagato	Carbon Composites	Light Weight	2012



Joint ventures with Carbon Fiber Suppliers by Automotive OEM's to drive innovation and fuel economy











Carbon Fiber Supplier	Тогау				
Company	Daimler				
Year	2011				
Туре	Joint Venture				
Description	Manufacturing of automotive CFRP parts				
Carbon Fiber Supplier	SGL Carbon				
Company	BMW				
Year	2010				
Туре	Joint Venture				
Description	Manufacturing of automotive CFRP parts				
Carbon Fiber Supplier	SGL Carbon				
Company	Volkswagen				
Year	2011				
Туре	SGL Stake Acquisition				
Type Description	SGL Stake Acquisition VW bought 8% stake in SGL Carbon				
Type Description Carbon Fiber Supplier	SGL Stake Acquisition VW bought 8% stake in SGL Carbon Toho Tenax				
Type Description Carbon Fiber Supplier Company	SGL Stake Acquisition VW bought 8% stake in SGL Carbon Toho Tenax General Motors				
Type Description Carbon Fiber Supplier Company Year	SGL Stake Acquisition VW bought 8% stake in SGL Carbon Toho Tenax General Motors 2011				
Type Description Carbon Fiber Supplier Company Year Type	SGL Stake Acquisition VW bought 8% stake in SGL Carbon Toho Tenax General Motors 2011 Partnership				



Carbon Fiber Potential in 2017 at 50% current Carbon Fiber Price – Advent of Low Cost Carbon Fiber Would Open New Opportunities

<i>Global Automotive Production by Car Type in 2017</i>	Expected Vehicle Production in 2017	Expected use of CF in Cars	Carbon Fiber Demand (M Ibs) @ 0.50 X current price	Carbon Fiber Demand (\$ M) @ 0.50 X current price
Super Cars	1 1 1 1 6K 1	100% of cars	1.3 M lbs	\$7 M
Super Luxury Cars	1 600K 	10%	 101 2 M lbs	\$506 M
Luxury Cars	I I I 4 Million I			φουο m
Other/Regular Cars	I I I 92 Million I	1%	202.4 M lbs	\$1,012 M
Global Automotive Production in 2017	I I 97 Million I	 	305 M lbs	\$1,525 M





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Global Composite Materials Market by Segment in 2017



Key Insights

- Lucintel forecasts global composite materials market to grow by 8.2% in 2012
- Global composites end product market is expected to grow at 7.4% CAGR to 2017
 - Improved financing and availability of credit
 - Positive sign of healthy growth with gradual bounce back of automotive, construction, electronics and consumer goods markets
- Asia will drive future growth of composite materials to 2017. Europe to see moderate growth.

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Composites Market Opportunity in 2012 – 2017: Aerospace & Wind Energy markets show highest growth potential



Global Composites Market Opportunity

* Size of the bubble describes size of the market in Million lbs

Creating the Equation for Growth



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Relative Market Attractiveness by Region: Aerospace and Wind Energy Segments show most attractive markets for growth

Market Segment	North America	Europe	Asia	Rest of World
Transportation				
Marine				
Aerospace				
Pipe & tank				
Construction				
Wind				
Consumer Goods				

- Attractiveness comparison is analyzed among different market segments of the same region ٠
- Attractiveness is analyzed by taking different parameters such as current and future market potentials

High



Medium







Low



US Wind Energy market improved in 2011, cumulative installations grew by more than 30% over 2010



2011

Challenges as overall wind market in Current Scenario

- Slow growth in energy demand has a multiplier effect on new capacity projects which are 50% renewable
- Fall of natural gas prices affecting wind competitiveness
- Connectivity issues impacting new projects
- Lack of robust long term federal targets for renewable energy continues to impact investor confidence and credit availability
 - State level RPS targets are main driver

2017

Solutions

- Demand to grow with renewed economic vigor with EIA forecasting 2% CAGR in next 5 years for overall demand in energy
- Forecast 7% CAGR in natural gas prices in 5 yrs
- Texas is leading way to new connectivity
- Political support for renewable energy expected to remain



Why Wind: Even in highly developed wind markets such as Germany, penetration relative to potential is low, while larger markets such as the US have very low penetration levels

A					Key Insights
Wind energy potential	Germany	India	Mexi South Afr	USA China Russia Brazil	 Both the US and China show strong potential and low current penetration Russia has high potential but current share of wind is <1 percent due to availability of alternate energy sources PROFINA program is expected to drive wind power sector in Brazil, targeting 5,000 MW installation by 2015 Germany, widely considered a leading
G	30%		indunesia		economy in adopting wind energy, is
	3 0%	1	5%		currently at 30% penetration
	Percer	ntage of wind ener	gy penetration vs. p	otential	

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Wind Market Insights: increasing blade length requires better blade design, improved blade materials, lower process and life cycle cost



Current Focus areas for Wind blades

• Design:

 Improved Aerofoil design for better load distribution across the blade cross section area which increases reliability and performance

• Improved Materials:

- With increasing length, need for higher strength-to-weight ratio material
- Mixture of fiber glass and carbon fiber to improve the stiffness and tensile strength in the fiber direction

• Process:

- Process improvement to reduce total production time
- Lower Life cycle cost:
 - Improved reliability
 - Reduced manufacturing cost
 - Lower operation and maintenance cost





Composite End Products Market Potential Analysis in 2017 at Different Price Points



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Conclusions

- Composites industry is sustainable with over 30,000 known applications
- Strong growth expected in the foreseeable future, led by accelerated BRIC growth
- Weight savings, fuel economy and other performance benefits will fuel the growth of composites consumption in Automotive
- High cost of materials and lack of competitive manufacturing processes for high volume automotive applications continue to be limiting factors for future growth
- New reality in various emerging countries will change geo-political and geo-economical elements of market. . . .players must react accordingly
- New business models need to be developed to address fast changing complex world

-Quarterly demand for composites shipments monitored by Lucintel show significant changes (up to 40% change Quarter by Quarter) in various market segments

- Companies driven by innovation in developing nations will gain and maintain market share
- Innovations aimed at lowering cost of end products by 30% have potential to grow composites market by a factor of 3x
- Significant interest in carbon fiber applications in Automotive Market



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About Lucintel

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Thank You



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- Senior level consultants and analysts
- PhDs and MBAs
- Masters level engineers
- Scientists and Industry experts
- Past projects ranging from start up to multi-national Fortune 500 companies.





Lucintel's Unique Capability for Your Project

Lucintel offers following benefits for your project:

- No Learning Curve Deep industry knowledge and insight
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- Neutral Third Party Position for better market info access and interpretation

Continuous networking with whole value chain including customers, suppliers and competitors

Access to vital, hard to find insights through detailed primary and secondary research and analysis. Incomparable data accuracy and integrity





Lucintel has an extensive toolkit to address key strategic questions for increasing your company's profitability and market presence



Key Questions

- Is market space / opportunity of current product offerings sufficiently robust?
- Market is focus for many: how can my company profitably differentiate?
- Based on our core skills, where should we focus?
- Should we build or buy? Is build even an option?
- What game changer actions exist and/or is a more incremental approach best?
- What is the order sequence of market entry segments / products?



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Genaro Gutierrez, PhD, Business Dev. Manager – Dow Chemical

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Mike Jackson, Stahlin

"Lucintel has its finger on the pulse of the market and drives deep Strategic Insight" **Andy Schmidt, MacQuarie Partners, Managing Partner**



THANK YOU!

