



**North American
Pultrusion Conference**

North American Pultrusion Market

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Lucintel, a Management Consulting and Market Research Firm

Agenda

- **Executive Summary**
- **North American Pultrusion Opportunity and Addressable Market**
- **Limitations of Pultruded Products**
- **Strategic Opportunities & Future Growth Areas**
- **About Lucintel**

Executive Summary

- **According to Lucintel’s market research, the addressable market for pultruded parts is over \$600 Bil. Pultruded parts represent a small fraction (0.2%) of the overall addressable market**
 - Huge potential for growth for pultruded parts in rebar, grating, utility poles and structural shapes. Need for good application development to target these large volume markets
- **In 2022, demand for pultruded products in North America was about \$1 billion and is expected to grow at a CAGR of 4.1% during next six years (2022-2028)**
 - Construction is the major segment for the pultrusion market
 - Increasing demand for pultruded wind blade spar cap, owing to exceptional cost & performance benefits
- **The pultrusion market is relatively small and characterized by high levels of fragmentation and competition. There are more than 150 pultruders globally. In North America, some of the pultruders are Strongwell, Creative Pultrusion, Bedford, Werner, Enduro Composites, Tecton, Glasform (Avient), Valmont, Geotek, Fibergrate Composites, etc.**
 - Since the revenue of most players in this market is small, it becomes challenging for them to invest in new application development, innovation and geographic expansion
- **Despite the current difficult environment for pultruders, the long-term prospects for this market segment are attractive.**
- **Note: The findings in this paper are based on Lucintel’s market report titled “Global Pultrusion Market: Trends, Opportunities and Competitive Analysis [2023-2028]”**

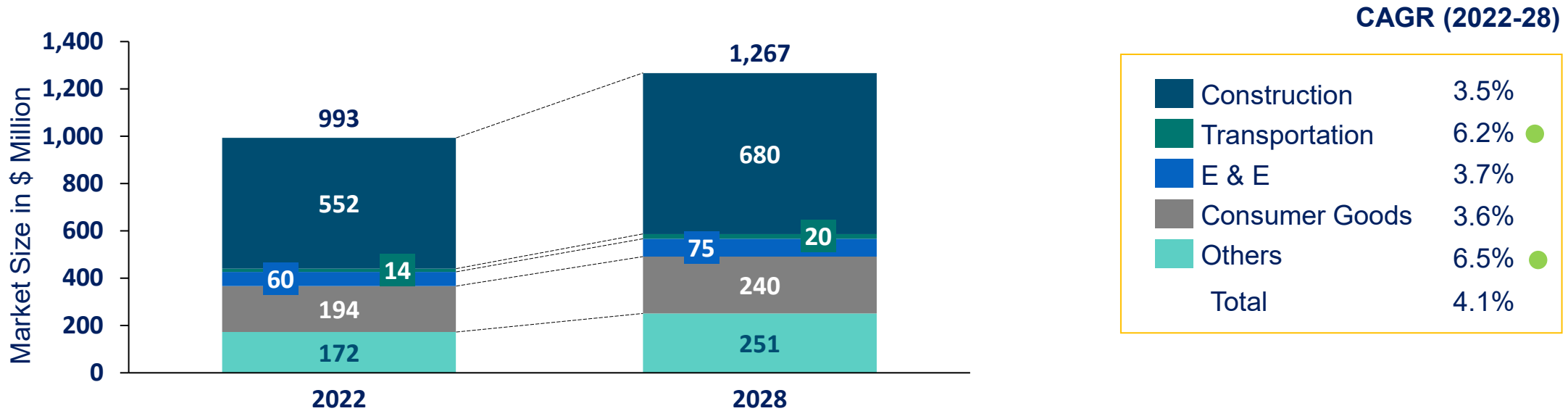
North American Pultrusion Opportunity and Addressable Market

Structure shapes, ladder rails, window profiles, wind turbine blade spars, and gratings are a few of the major pultrusion applications

	Building & Construction	Consumer Goods	Chemical	Cooling Tower	Electrical	Wind Energy
						
Major Applications	<ul style="list-style-type: none"> • Window profiles • Structural shapes • Rebar • Utility pole • Road markers 	<ul style="list-style-type: none"> • Ski poles • Tent poles • Tool handles • Ladder rails 	<ul style="list-style-type: none"> • Gratings • Structural shapes • Water treatment 	<ul style="list-style-type: none"> • Structural shapes • Gratings 	<ul style="list-style-type: none"> • Electric cable tray • Insulators 	<ul style="list-style-type: none"> • Pultruded spars
Major Competing Materials	<ul style="list-style-type: none"> • Steel • Aluminum • Plastics • Wood • Composites 	<ul style="list-style-type: none"> • Wood • Plastic • Composites • Steel • Aluminum 	<ul style="list-style-type: none"> • Steel • Composites 	<ul style="list-style-type: none"> • Steel • Wood • Composites 	<ul style="list-style-type: none"> • Steel • Aluminum • Composites 	<ul style="list-style-type: none"> • Composites

The North American pultrusion market is expected to achieve a CAGR of 4.1% over the next six years

North America Pultrusion Market Forecast in \$M



Note: Wind energy included in Others

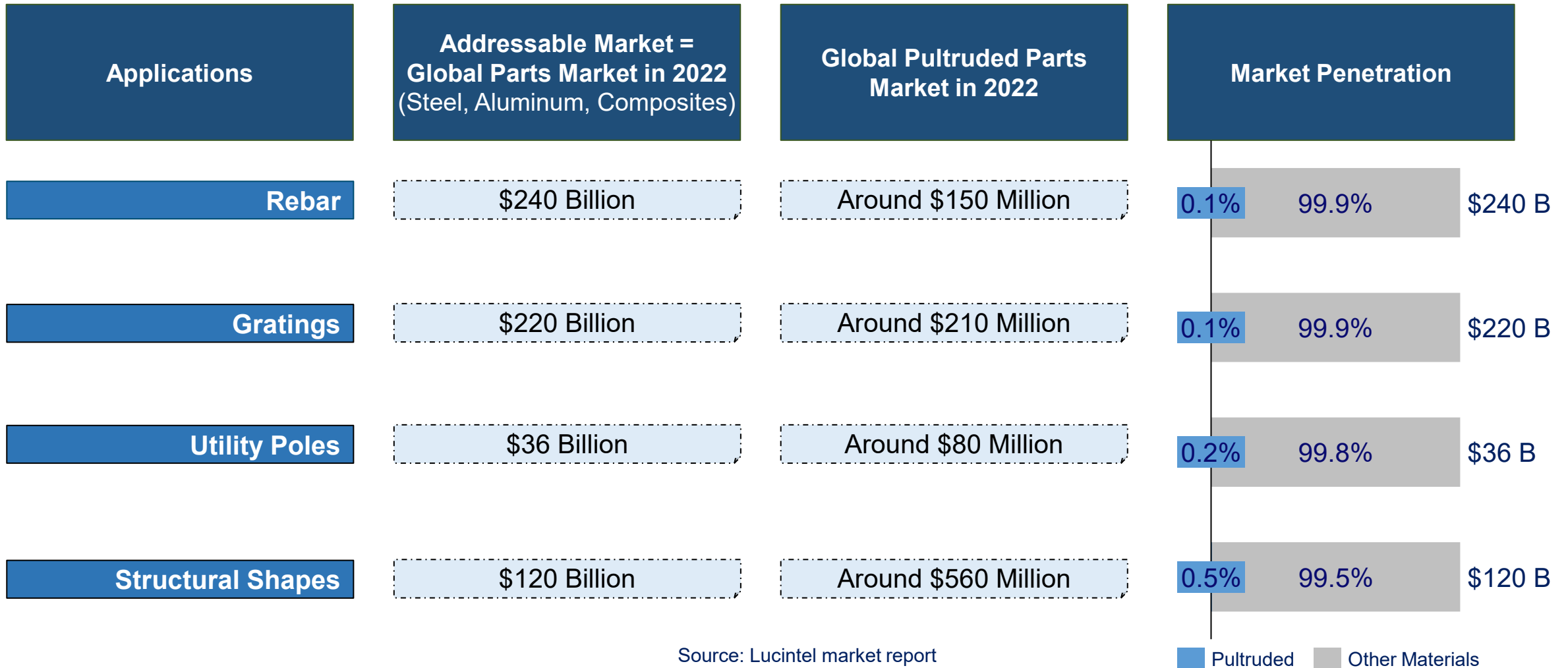
Source: Lucintel market report

Green color signifies high growth segments

Key Insights

- Significant opportunity for pultruded parts in construction, consumer goods and industrial applications.
- Growth of the construction industry is expected to drive the North American pultrusion market

Addressable market for pultruded parts is over \$600 Bil. Pultruded parts have low market penetration, therefore, huge growth opportunity



Source: Lucintel market report

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Drivers and Challenges: Growth in the construction and wind energy industries are major growth drivers for the pultrusion market

Key Drivers

Driver 1: Growth of the Construction market

- Construction is the major end use industry for the pultrusion market. Growth of construction industry is expected to drive the pultrusion market

Driver 2: Increasing use of pultrusion technology in wind energy market

- Increasing wind turbine size, and the increasing share of offshore installations, are creating demand for stronger, stiffer, and lighter blades, thereby driving the pultruded laminates market

Driver 3: Ease of installation

- Less labor is required during installation due to light weight

Key Challenge

Challenge 1: Higher Cost than Competing Wood and Steel Parts

- Initial cost of pultruded products is relatively higher than for competing materials

Challenge 2: Lack of Education

- Lack of awareness about the benefits of pultruded products

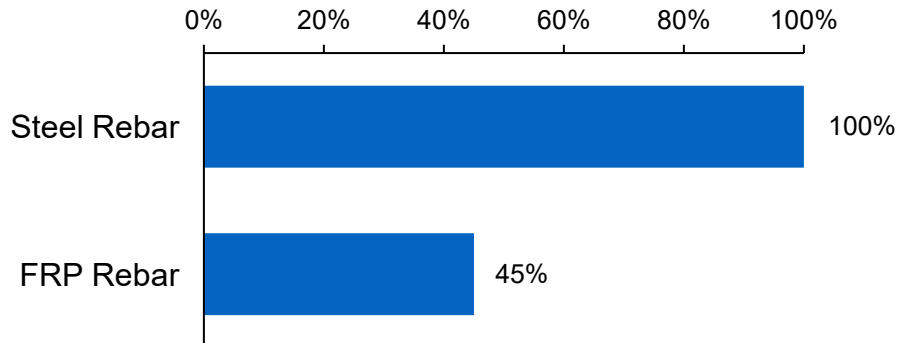


Limitations of Pultruded Products

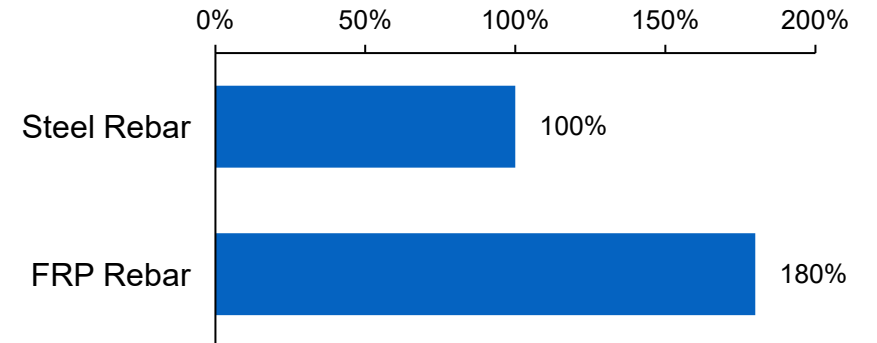
Pultruded parts offer considerable weight savings, but at higher cost

Rebar

Relative Part Weight

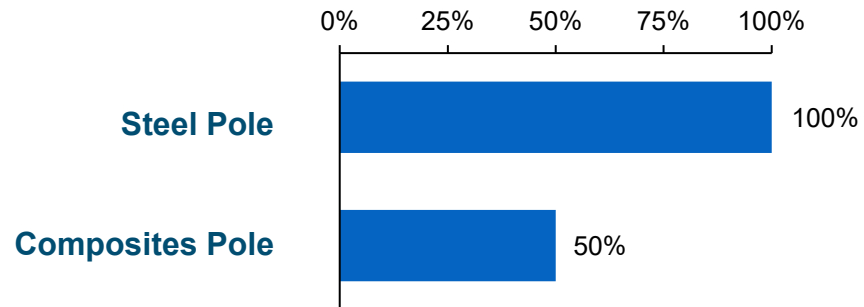


Relative Part Cost

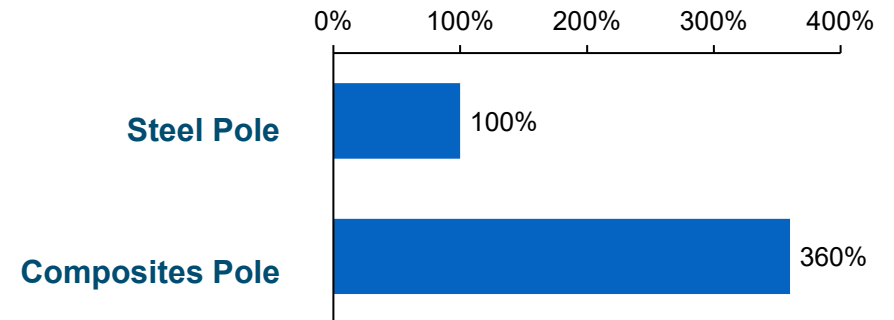


Utility Pole

Relative Part Weight



Relative Part Cost



Composites poles have high initial cost of around 3X times, and 2x times the average life, compared to competing materials

Materials	Initial Pole Cost (\$)	Average Life (Years)	Maintenance Cost (\$)	Cost/Year (\$)
Wood	\$250	30	\$210	\$15
Steel	\$260	35	\$245	\$14
Concrete	\$350	35	\$245	\$17
Composites	\$900	80		\$11

Note: Costs are based on a 40ft, class 4 pole
 Maintenance costs apportioned at US \$35 per pole per 5 year maintenance cycle

Key Insights

- **Despite of high initial cost of FRP poles than conventional materials, the overall total cost of ownership is lower, due to**
 - Virtually no maintenance cost for composite poles

Overall, high material cost and difficulty to manufacture complex structures are the major limitations of pultrusion compared to low cost competing products

Limitation

- High Materials Cost

- Difficult to manufacture complex structures

Industry Expectation

Glass fiber price reduction by 10%-30%

Resin price reduction by 10%-40%

Pultruded parts are generally constant in cross-section along the length of the part and thus has limitation in making complex structures



Strategic Opportunities & Future Growth Areas

There is huge potential for growth in pultruded structural shapes

- Global market for metal structural shapes, including rebar, is over \$300 Bil / year. Pultrusion represents less than 0.3% of the structural shapes market. There is huge potential for growth in varied pultruded structural shapes.

Flat Bar



Angle



Round



Rebar



Sheet / Plate



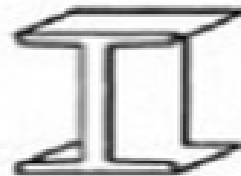
Channel



Wide Flange Beam



Standard / I-Beam



Square / Rect. Tubing



Pipe / Round Tubing



Future Growth Areas: Wind turbine blades, telecom antennas, utility poles, and others are some of the growth applications

Construction & Infrastructure



Window Profile



Rebar



Trellis



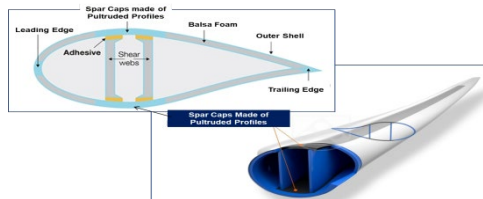
Utility pole

Telecommunication



Antenna

Wind Energy



Wind Blade

Drivers

- Increasing urbanization
- Increasing number of old bridges

- Increasing GSM services
- Excellent electromagnetic properties

- Growth of wind turbine blade production and installations

Civil Engineering Strategy: Educate DOTs and related parties via workshops, trade shows, and lobbying

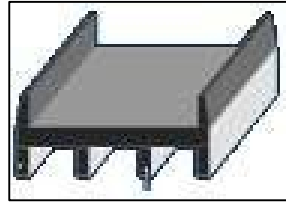
Application



Rebar / Cable



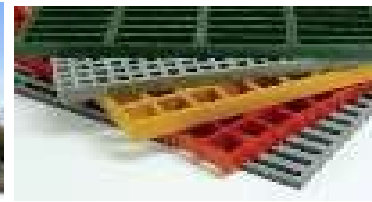
CFRP Plates



CFRP Girders



FRP Pole



Putrudded Profiles



Push Strategy: Educate Related Parties

Workshops: Conduct workshops for DOTs & stakeholders to educate them about the offerings and their benefits

Participate in Civil Engineering Tradeshow and Exhibitions: ASCE Annual Civil Engineering conference, AASHTO Annual Meeting, International Bridge Conference

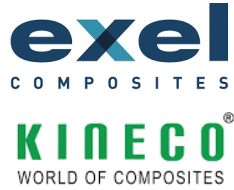
Lobby: With the help of key lobbyists, influence DOTs, and other concerned Govt. agencies

Publish & Advertise in Magazines such as “Civil Engineering.” The flagship monthly magazine of ASCE (American Society of Civil Engineers). A huge readership (primarily from civil engineering) base of ~79,000

Develop Cost-Effective Composites Solutions

Lucintel discussed with many DOTs (Departments of Transportation) during the last five years and found increasing awareness of composites; however, there is still lack of awareness to leverage potential

Strategic collaboration and acquisition can be an effective way for companies in the pultrusion market to gain a competitive advantage in various regions



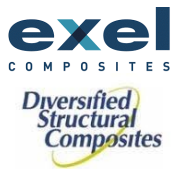
Kineco Group, India's leading player in the Advanced Composites market, has signed a joint venture agreement with Exel Composites Oyj, a Nasdaq Helsinki listed, globally recognized composites company in 2021 to develop pultrusion products in India.



KraussMaffei Group GmbH, the German manufacturer of injection molding machines, machines for plastics extrusion technology, and reaction process machinery, has acquired Pultrux Ltd., a UK-based based provider of pultrusion, pullwinding, and filament winding systems in 2019



Creative Pultrusions, Inc., a leading pultrusions manufacturer, acquired Composite Advantage in 2018. Composite Advantage will be a division under CPI, a subsidiary of Hill & Smith Holdings PLC.



Exel Composites plc. acquired Diversified Structural Composites Inc. in Erlanger, KY in 2018 to enter into the North American market

Recent Strategic Moves are Helping Companies to Strengthen Their Market Position

Moderate to High Strategic Impact

Partnership

- In 2022, **Owens Corning** entered into a partnership with Pultron Composites to manufacture industry-leading fiberglass rebar

Acquisition

- In 2023, **Creative Composites Group** acquires Enduro Composites, expands product portfolio
- In 2021, **Creative Pultrusions Inc.** acquired Kenway Corp to expand its product offerings
- In 2018, **Exel Composites** acquired Diversified Structural Composites to establish themselves in the North American market

Low to Moderate Strategic Impact

Certification

- **Fibergrate Composite Structures** has achieved ASTM F3059-18 certification for phenolic grating

China exports a significant amount of pultruded products, such as pultruded gratings, profiles, etc., to the US and Europe

- China is a significant supplier of composite grating products globally. Chinese companies have been able to leverage their expertise in composite materials to become major players in the composite grating market.
- Chinese composite grating manufacturers produce a wide range of products, including pultruded gratings, and structural profiles.
- China's composite grating industry is centered in areas such as Nantong, Suzhou, and Shanghai, where many large manufacturers are located.
- Chinese composite grating manufacturers have been successful in capturing market share from competitors in countries such as the United States and Europe, and have become major suppliers to customers around the world.
- However, as with any product, customers should be careful to source composite grating products from reputable manufacturers and to ensure that the products meet all relevant quality and safety standards.



Conclusions

- **The North American market provides opportunities for consolidation. Do you want to be a consolidator, or to be consolidated or drive organic growth?**
- **There are requirements for innovation in the properties and performance characteristics of fiber and resin. The future involves thermoplastic resins with high fiber loading levels**
- **To become one of the future market leaders in pultrusion, companies need to consider and develop clear strategies and objectives in the following areas:**
 - Application development
 - Creating awareness on benefits of composites and pultrusion
 - Cost reduction in composite parts
 - Geographic expansion
 - JV / Acquisition
 - Access to capital
- **Lucintel, a Dallas based management consulting and market research firm, has been helping companies build great strategies related to their organic and in-organic growth opportunities**

About Lucintel



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Lucintel - At a Glance

- Premier management consulting and market research firm. Founded in 1998.
- Deep global insights into major industries. Team of over 120 analysts / consultants across globe
- Management comprised of PhDs, MBAs, and subject matter experts. Head quarter in Dallas, USA.

Conducted 500+ consulting projects across industries for 3M, Audi, Dupont, Carlyle, GE, etc.

Consulting Services



Why Lucintel

Trusted insights: Reliable insights. Widely cited in Wall Street Journal, Financial Times, Forbes, etc.

Clients we serve: Over 1000 clients from 70 countries – Fortune 500 companies

Strategic advice: Over 20 years of proven global strategic management consulting experience

Industries Served



We Have Completed Hundreds of Consulting Projects Across the Globe to Define Corporate Directions and Strategies



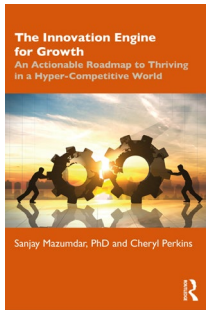
About Speaker



Sanjay Mazumdar, PhD.

CEO, Author, Thought Leader & Strategist

- CEO of Lucintel. Offered advisory services (M & A, market entry) to hundreds of clients over 20 yrs.
- Author of two books (The Innovation Engine for Growth and Composites Manufacturing) and Thought leader. Articles published in Wall Street Journal, Financial Times and in various magazines
- Conducted hundreds of strategic growth consulting projects, due diligence, M & A.
- Deep materials, market and technology expertise. Hands on experience in making parts for automotive and industrial applications.
- Worked for General Motors and other companies in the past and received 2 Record of Inventions



Roy Almaguer

Director, Client Engagement

- Over 15 years of industry experience in International Business Development & Sales
- Instrumental in creating new growth opportunities for the client that translated into direct profit
- Experienced in business development addressing client needs across multiple geographies.
- Bachelor in Business Administration, Texas A & M University

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