



## UK Composites Industry Competitiveness and Opportunities

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### A Total of 110 Interviews have been Completed Across the UK Composites Supply Chain



**Note:** This UK Composites Study is conducted by Lucintel and its partner Optimat. Optimat was involved in primary research. Significant support was received from Innovate UK, KTN, BEIS, HVM Catapult, CLF, Composites UK, and many UK-based composite material & part suppliers during this research.



### Research Methodology: Lucintel and Optimat did Extensive Secondary Research and Primary Research to Analyze Market Demand

Lucintel and Optimat conducted extensive interviews and research with key players in the UK composites industry in various key markets to identify market size, growth potential, and more as discussed below.

- 1. Lucintel did extensive secondary research to identify companies across the supply chain of various composites markets
- 2. Constructed a discussion guide to identify the list of composites parts produced, revenue, market size, growth rate, drivers and challenges
- 3. Identified major composites part fabricators in various UK composites markets and interviewed them as per the discussion guide to identify their total revenue, composites revenue, growth trends
- 4. After gathering company level data, estimated market size, trends and forecasts for the overall composites market was carried out for all the sectors
- 5. Performed market size and forecast validation by talking to major players about their estimates on the market
- 6. Talked to some major tier players for value addition in some sample parts for four major industries including aerospace, defence, automotive and wind energy



### **Primary Research Output and Challenges**

- Prepared list of major composites part fabricators in the UK for various industries. More than 200 companies were identified across all the sectors
- > Developed contact list for all major companies identified
- Detailed discussion guide was prepared for face to face, telephonic, and web survey, which was reviewed and approved by the Innovate UK & KTN teams
- Received help from CLF, Innovate UK, & KTN teams to enable several meetings
- More than 60 interviews were conducted with part fabricators in various industries to identify the list of composites parts produced, revenue, market size, growth rate, drivers, and challenges
- Also, major OEMs from various sectors were interviewed to collect their feedback on industry challenges, trends, capabilities and technology needs, government support, and COVID impact on each industry
- > Talked to various major tier players to investigate value addition in particular sample parts for the four major industries

#### **Challenges During Primary Research**

- > COVID pandemic and shut down of companies affected and delayed some of the interview process
- Many companies declined to share information due to confidentiality issues or shared only certain details. However, Lucintel's and Optimat's teams successfully conducted >110 interviews across various industries to validate all the findings
- > Different data collection methods (in-person, telephone, web) produced differing levels of detail into the underlying data



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### **Executive Summary (1/2)**

- The UK composites supply chain comprises more than 400 companies and employs about 30,000 people. Supply chain is robust in the aerospace and defence sectors, as there are world class players present to meet the local demand
  - There are limited players in glass fibre and carbon fibre, with the majority of fibres being imported to meet the demand.
     For intermediate materials (prepreg and textiles), the supply chain is good, with major international players present in the UK
  - In the automotive industry, there is significant reliance on imports to meet domestic demand
  - In the wind energy industry, key multinational players have plants in the UK for making wind turbine blades, but still, more than 60% of composite parts are imported to the UK for the wind energy market. This ratio changes on a year-byyear basis, based on contracts won
  - Part fabricators in construction, marine, rail, and oil & gas have good competitive advantages, and are able to meet local and international demand without relying much on imports
- The UK composites industry is highly technology-intensive, valued at £4.0 billion (raw materials and parts) in 2019. The market is expected to grow at a CAGR of 2.9% from 2019 to 2035 to reach £6.3 billion by 2035
  - About 17% of composite parts are exported to countries like France and Germany. Imports contribute about 26% of the demand, which includes nacelle covers, automotive BIW (body in white) structures



### **Executive Summary (2/2)**

- Aerospace, defence, automotive, and wind energy are the four major markets for the UK and represent 79% share of the total UK composites demand (by value)
  - Aerospace & Defence together represent a £1.5 billion opportunity and are highly technology-intensive. There are world class players in the UK to meet local and global demand, use advanced composites technologies like autoclave, AFP/ ATL, over molding, out of autoclave and resin infusion processes to make structural and interior composites parts. Entry barriers in these markets are high, so established players have a competitive advantage
  - Automotive represents a £0.5 billion opportunity but there is a lack of competitiveness in local suppliers in this market.
     Major global OEMs and Tier 1 players that use composites are not present in the UK. There is a need to develop more cost-effective technologies and materials to address local demand as this market is highly price-sensitive for volume segment
  - Wind energy represents a £0.25 billion opportunity and there are world class players such as MHI Vestas and Siemens Gamesa to address local needs. The wind energy industry represents a good growth market for the UK as blades have to be locally produced due to being so large (>50m). This market is forecast to grow more than 4% CAGR to reach £0.47 billion by 2035. There is need for government support to drive growth in the wind energy market
  - The value creation from raw materials to part manufacturing is about 6 times for aerospace & defence, while in the automotive and wind energy markets, it is about 3 times



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# The UK has Good Presence of World Class Players in Aerospace, Defence and Wind Energy Industries ...(1/2)

Industry	Number of Major Part Suppliers	Leading Part Manufacturers	Leading OEMs	Major Composite Parts Produced	Market Size (£ M)- 2019	Confidence Level on Market Size
Aerospace	>40	GKN, Spirit, Aernnova, Collins, Safran, MTAG	Airbus	Trailing edge wing spar, spoiler, wing structures, interior parts	£889 M	High
Defence	>15	BAE, GKN, Meggit, Leonardo	Airbus, BAE, Leonardo	Front fuselage, canopy, dorsal spine, tail fin, inboard flaperons, rear fuselage section	£579 M	High
Automotive	>120	MCT Carbon, Prodrive, Formaplex, Creative Composites	McLaren, Bentley, Nissan UK, Toyota UK, Aston Martin, Jaguar Land Rover	Headliners, interior trim components, chassis, carbon trims, body panels, air intake manifolds	£505 M	High
Wind Energy	>5	MHI Vestas, Siemens Gamesa, Exel	MHI Vestas, Siemens Gamesa	Wind blades, spar caps	£242 M	High

**Confidence Level** 

Moderate High

Source: Lucintel analysis, Interviews

Low



# The UK has a Number of the Major Boat Builders and Rolling Stock Manufacturers, such as Princess Yachts, Sunseeker, Hitachi Rail, Bombardier...(2/2)

Industry	Number of Major Part Suppliers	Leading Part Manufacturers	Leading OEMs	Major Composite Parts Produced	Market Size (£ M)- 2019	Confidence Level on Market Size
Marine	>15	Princess Yachts, Sunseeker, Fairline Yacht, MTAG	Princess Yachts Int., Sunseeker, Fairline Yachts, Ribcraft, RNLI	Hull, deck, mast, superstructure	£194 M	Moderate
Construction	>30	Epwin, Kingspan, Filon Products	Not Applicable	Gratings, window and door profiles, claddings, pultruded components	£139 M	High
Rail	>15	Bombardier Rail, TRB, MTAG	Hitachi Rail, Bombardier	Rail underbody parts, interior panels, outer body panels	£60 M	Moderate
Oil and Gas	>8	Magma Global, Baker Hughes, Balmoral, Trelleborg	Shell Global	Flexible pipe, buoyancy modules	£21 M	Moderate

**Confidence Level** 

Moderate

High

Source: Lucintel analysis, Interviews

Low



### In Composites Value Chain, the UK has Good Manufacturing Base for Resin, Intermediates, and Composites Parts, But Lacks Global Players in Fibres





### Despite the Presence of Leading OEMs and Tier Players, There are Only a Limited Number of UK Raw Material Suppliers



Wind Energy	Wind Energy	
Aerospace	Aerospace	
Defence	Defence	
Automotive	Automotive	
Rail	Rail	
Construction	Construction	
Marine	Marine	
Oil and Gas	Oil and Gas	•

Supply Chain Node	Symbol
Resin Suppliers	
Fibre Supplier	*
Intermediate Suppliers	
Tier Players	
OEMs	•

"All the raw materials that we are using are imported. As a global business, we buy raw materials at the same time to get economies of scale. **The supply base in the UK is lacking.** A global purchasing strategy requires large volume suppliers, which is creating massive pressure for local content, and it is difficult to achieve"

OEM

#### Source: Lucintel analysis

<u>Note:</u> Aim Altitude, Creative Composite, Exel Composites, Formtech Composites, Permali, Prodrive Composites, Pultrex, Rochling, TRB Lightweight Structures are serving multiple industries. Number in each symbol depicts the number of companies located in a particular area



### In the UK Value Chain, 3 to 6 Times Value is Created from Materials to End Part Manufacturing. Raw Materials Demand is £0.4B and Part Demand is £2.8 B





### The UK has Moderate Competitiveness in Part Manufacturing Low Competencies in Fibres and High Volume Manufacturing Industries

Competitive Strength	Fibres & Resins	Intermediates (Fabrics, Compounds, & Prepreg)	Part Fabricators
Number of Companies in the UK Composites Industry	>15	>10	>300
Technical Strength of Domestic Players Compared to International Players	Low	Moderate	Moderate
Workforce Skill Set compared to International Workforce	Low	Moderate to High	Moderate
Cost Position (Overhead Cost, Material Cost, Overall Cost of Production)	Low	Moderate	Low to Moderate
Trends in Competitiveness of Domestic Players			
Drivers for Future Competitiveness	Low-cost carbon fibre, recycled carbon fibre	Low-cost prepreg	Design capability, low-cost manufacturing
Overall Assessment of Competitive Strength	Limited suppliers in glass and carbon fibre. R & D programs needed to address recyclability	Moderate presence of international players. Ensure availability of materials	Good capability in aerospace & defence. Low competencies in high-volume, price-sensitive markets such as automotive and construction



### Supply Chain is Robust for the Aerospace and Defence Industries in the UK Composites Industry

Industry	Major Composite Parts Manufactured	Major Raw Materials Used	Major Technologies Used	Supply Chain Strength	Export Capability
Aerospace	<ul> <li>Trailing edge wing spar</li> <li>Spoiler</li> <li>Wing structures</li> <li>Radomes</li> <li>Interior cockpit</li> <li>Engine components</li> <li>Aircraft seat backs</li> <li>Seating components</li> </ul>	<ul> <li>Carbon fibre prepreg</li> <li>Carbon fibre textile with epoxy resin</li> </ul>	<ul> <li>Autoclave</li> <li>AFP / ATL</li> <li>Out of Autoclave</li> <li>Resin Infusion</li> </ul>	<ul> <li>International players serving local OEM needs</li> <li>Aerospace supply chain is strong from intermediates to part production</li> <li>Good government support</li> <li>Highly skilled workforce</li> <li>High end technologies (ATL / AFP)</li> </ul>	<ul> <li>Moderate export capability, mainly for wing components</li> </ul>
Defence	<ul> <li>Front fuselage</li> <li>Canopy</li> <li>Dorsal spine</li> <li>Tail fin</li> <li>Inboard flaperons</li> <li>Rear fuselage section</li> </ul>	<ul> <li>Carbon fibre prepreg</li> </ul>	• Autoclave • AFP/ATL	<ul> <li>Robust supply chain with presence of players in all nodes of the value chain</li> <li>International players serving local market to meet OEM needs</li> <li>Good government support</li> <li>Highly skilled workforce</li> <li>High end technologies (ATL/AFP)</li> </ul>	• High export capability - mainly exporting front fuselage, canopy, dorsal spine, tail fin, inboard flaperons, rear fuselage section to partner companies
Wind	<ul><li>Wind Blades</li><li>Spar Caps</li></ul>	<ul> <li>Glass fibre textile with epoxy resin</li> </ul>	<ul> <li>Vacuum Assisted Resin Transfer Molding</li> <li>Hand layup</li> </ul>	<ul> <li>International players are present</li> <li>Technology know-how</li> <li>Skilled workforce</li> <li>Lack of domestic players in nacelles</li> </ul>	<ul> <li>Good export capability</li> <li>Major companies are winning frequent project orders from other European countries</li> </ul>

Source: Lucintel analysis, Interviews

Med

Low

High

Strength



### The UK Automotive Composites Industry Lacks Supply Chain Strength to Meet Local Demand. The Rail Industry has Good Export Capability

Industry	Major Composite Parts Manufactured	Major Raw Materials Used	Major Technologies Used	Supply Chain Strength	Export Capability
Automotive	<ul> <li>Headliners</li> <li>Interior Trim Components</li> <li>Chassis</li> <li>Body Panels</li> <li>Air intake manifolds</li> <li>Carbon trims</li> </ul>	<ul> <li>Carbon fibre textiles</li> <li>UPR/Epoxy Resin/Compoun d</li> <li>Carbon fibre prepreg</li> </ul>	<ul> <li>Compression Molding</li> <li>Injection Molding</li> <li>Resin Infusion</li> <li>Autoclave</li> </ul>	<ul> <li>Moderate competitive strength</li> <li>Highly import driven</li> <li>High labor cost</li> <li>Absence of international Tier players</li> </ul>	<ul> <li>Low export capabilities for high volume cars</li> </ul>
Marine	<ul> <li>Hull</li> <li>Deck</li> <li>Masts</li> <li>Superstructures</li> </ul>	<ul> <li>Glass fibre textiles</li> <li>Carbon fibre textiles</li> <li>UPR and epoxy resin</li> </ul>	<ul><li> Hand Layup</li><li> VARTM</li><li> Autoclave</li></ul>	<ul> <li>Technology Know how</li> <li>State of the art manufacturing facilities</li> </ul>	<ul> <li>Moderate export capabilities</li> </ul>
Rail	<ul> <li>Rail underbody parts</li> <li>Interior Panels</li> <li>Outer body panels</li> <li>Lavatory Modules</li> </ul>	<ul> <li>Glass fibre</li> <li>UPR and phenolic resin</li> </ul>	<ul><li> RTM</li><li> Hand layup</li><li> Pultrusion</li></ul>	<ul> <li>Technology know-how</li> <li>Presence of international players, such as Bombardier and Hitachi are making parts and have plants in the UK</li> </ul>	• Moderate export capabilities



### The UK Oil and Gas Industry has Good Competitive Strength and Strong Export Capabilities

Industry	Major Composite Parts Manufactured	Major Raw Materials Used	Major Technologies Used	Supply Chain Strength	Export Capability
Oil and Gas	<ul><li>Flexible pipe</li><li>Buoyancy Modules,</li></ul>	<ul> <li>Carbon fibre with epoxy</li> <li>Glass fibre with polyester/vinyl ester</li> </ul>	<ul><li>Filament winding</li><li>Pultrusion</li></ul>	<ul> <li>Presence of international players in the UK</li> <li>Moderate number of suppliers supplying global market</li> <li>Technology know-how</li> </ul>	<ul> <li>Good export opportunity</li> <li>Companies are mainly exporting to countries such as Brazil, Mexico, West Africa, and other countries</li> </ul>
Construction	<ul> <li>Gratings</li> <li>Window and door profiles</li> <li>Claddings</li> <li>Pultruded components</li> <li>Tunnel reinforcement plates, etc.</li> </ul>	<ul> <li>Glass fibre with polyester resin / vinyl ester</li> </ul>	• Pultrusion	<ul> <li>Technology know-how</li> <li>Number of small companies satisfying local demand</li> </ul>	<ul> <li>Moderate capability in export</li> <li>Pultruded products are generally high-volume and are easily exported to other EU countries.</li> </ul>

Source: Lucintel analysis, Interviews

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### Composite Companies in the UK have Export Capability, where They Supply to Other European Countries



"All the raw materials that we are using are imported. As a global business, we buy raw materials at the same time to get economies of scale. The supply base in the UK is lacking. Whereas if we talk about exports, the last two years project were for other European countries"

#### Leading Wind OEM/Part Fabricator

Wind Energy

"We import raw material from other countries. As a global business, we believe in a central procuring system. Fibre matting we use in pre-cut shapes/interlocking patterns from India and China. Balsa wood core we get from South America and all resins are from non-UK suppliers. Exports are mainly driven as per projects" Leading Wind OEM



**Oil and Gas** 

"We mainly produce buoyancy products. Our products are exported to other countries. Mostly we sell to Brazil, followed by the next biggest markets, such as Gulf of Mexico and West Africa"

#### Part Fabricator for Oil and Gas Industry



Aerospace

"We mainly produce composite components for the aerospace industry and supply around 50% of our products to UK OEMs, and the rest about 50% of our output is transported to other European countries" **Part Fabricator, Aerospace Industry** 



### Summary of the UK Composites Supply Chain Analysis

- > The UK has moderate competitiveness in intermediates, whereas low competencies in fibres
- The UK has presence of some of the major players in all the key industries, such as Airbus, BAE, GKN, Rolls Royce, Leonardo, Lockheed Martin, Spirit Aerosystem, MHI Vestas, Siemens Gamesa, McLaren, and Bombardier
- In the UK value chain, 3 to 6 times value is created from materials to end part manufacturing. Raw materials (fibre and resin) demand is £0.4 billion and part demand is £ 2.8 billion
- The UK has strong capabilities in part manufacturing, mainly in industries, such as the Aerospace, Defence, Wind Energy, that create good export opportunity for the country
  - The UK has good strength in high end automotive segment with the presence of major OEMs such as McLaren,
     Aston Martin, and Jaguar Land Rover, etc. whereas major parts are still imported from the other countries
  - The UK oil & gas and rail markets have good potential in terms of part development capabilities and thus create good export opportunities



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### In 2019, the Aerospace and Defence Industries Accounted for >50% of the UK Composites Demand...(1/2)

#### The UK Composites Part/End Market Demand by Industry Type: Trends and Forecast (£ M)



#### **Compound Annual Growth Rate (%)**

Compound Annual Growth Rate (%)	2015-19	2019-25	2019-30	2019-35
Aerospace	13.1%	-0.4%	1.5%	1.3%
Defence	24.9%	3.3%	3.6%	3.6%
Automotive	1.4%	1.5%	2.5%	2.2%
Wind Energy	17.2%	5.0%	4.4%	4.3%
Marine	6.4%	0.9%	2.2%	1.9%
Construction	7.5%	6.4%	5.4%	5.0%
Rail	24.7%	4.4%	4.7%	4.5%
Oil and Gas	18.1%	2.7%	3.8%	3.6%
Others	6.5%	3.0%	3.4%	3.1%
Total	11.5%	2.0%	2.9%	2.7%



### In 2019, the Aerospace and Defence Industries Accounted for >50% of the UK Composites Demand...(2/2)

#### Share of Industries in the UK Composites Market: Trends and Forecast



#### Key Insights

- The four leading composites markets (aerospace, defence, automotive, and wind energy) hold approximately 79% of the total opportunity in the UK
- The aerospace industry is the largest market for composites in the United Kingdom followed by the defence industry
- The wind energy industries is not going to see much impact from the COVID pandemic, and is expected to have good growth ~5% in the next five years



### COVID has Impacted the Composites Industry - Except Wind Energy, All other Industries Declined in overall Demand

Industry	Demand in 2015 (£M)	Demand in 2019 (£M)	Demand in 2020 (£M)- Post Covid	Demand in 2021 (£M)	Demand in 2025 (£M)	Demand in 2035 (£M)	Total Growth % (2015- 2019)	CAGR % (2015- 2019)	Total Growth % (2019- 2025)	CAGR % (2019- 2025)	Total Growth % (2019- 2035)	CAGR % (2019- 2035)
Aerospace	£544 M	£889 M	£542 M	£664 M	£868 M	£1,094 M	63.4%	13.1%	-2.4%	-0.4%	23.1%	1.3%
Defence	£238 M	£579 M	£560 M	£590 M	£703 M	£1,020 M	143%	24.9%	21.4%	3.3%	76.2%	3.6%
Automotive	£477 M	£505 M	£356 M	£413 M	£551 M	£721 M	5.9%	1.4%	9.1%	1.5%	42.7%	2.2%
Wind Energy	£128 M	£242 M	£255 M	£268 M	£323 M	£475 M	88.6%	17.2%	33.7%	5.0%	96.5%	4.3%
Marine	£152 M	£194 M	£137 M	£157 M	£205 M	£263 M	28%	6.4%	5.7%	0.9%	35.4%	1.9%
Construction	£104 M	£139 M	£125 M	£143 M	£201 M	£301 M	33.6%	7.5%	44.9%	6.4%	116.9%	5.0%
Rail	£25 M	£60 M	£57 M	£62 M	£77 M	£120 M	141.9%	24.7%	29.2%	4.4%	100.7%	4.5%
Oil and Gas	£11 M	£21 M	£18 M	£19 M	£24 M	£36.5 M	94.7%	18.1%	17.5%	2.7%	76.0%	3.6%
Others	£146 M	£188 M	£165 M	£180 M	£224 M	£308 M	28.7%	6.5%	19.2%	3.0%	63.6%	3.1%
Total	£ 1,825 M	£ 2,816 M	£2,212 M	£2,497 M	£3,177 M	£4,338 M	54.4%	11.5%	12.8%	2.0%	54.0%	2.7%

Notes: Above estimates are based on interviews conducted between the month of July and October 2020. CAGR stands for Compound Annual Growth Rate



### Market Demand and Annual Growth Rate 2019-2025: Market Growth is Highly Affected by the COVID Pandemic

Industry	Demand in 2019 (£M)	Demand in 2020 (£M)	Demand in 2021 (£M)	Demand in 2022 (£M)	Demand in 2023 (£M)	Demand in 2024 (£M)	Demand in 2025 (£M)	Growth % (2019 - 2020)	Growth % (2020 - 2021)	Growth % (2021 - 2022)	Growth % (2022 - 2023)	Growth % (2023 - 2024)	Growth % (2024 - 2025)
Aerospace	£889 M	£542 M	£664 M	£726 M	£778 M	£826 M	£868 M	-38.8%	22.5%	9.4%	7.1%	6.1%	5.0%
Defence	£579 M	£560 M	£590 M	£618 M	£646 M	£674 M	£703 M	-3.0%	5.4%	4.6%	4.5%	4.4%	4.2%
Automotive	£505 M	£356 M	£413 M	£449 M	£485 M	£518 M	£551 M	-29.3%	16.2%	8.7%	8.1%	6.7%	6.5%
Wind Energy	£242 M	£255 M	£268 M	£281 M	£294.5	£309 M	£323 M	5.0%	5.1%	5.0%	4.8%	4.9%	4.7%
Marine	£194 M	£137 M	£157 M	£169 M	£181M	£193 M	£205 M	-29.8%	14.8%	7.6%	7.3%	6.6%	6.4%
Construction	£139 M	£125 M	£143 M	£157 M	£170 M	£185 M	£201 M	-10.5%	15.2%	9.1%	8.4%	8.9%	8.7%
Rail	£60 M	£57 M	£62 M	£66 M	£69 M	£73 M	£77 M	-4.6%	10.0%	5.6%	5.5%	5.4%	5.4%
Oil and Gas	£21 M	£18 M	£19 M	£21 M	£22 M	£23 M	£24 M	-16.0%	11.1%	6.5%	5.7%	5.6%	5.6%
Others	£188 M	£165 M	£180 M	£190 M	£201 M	£213 M	£224 M	-12.6%	9.0%	5.8%	6.0%	5.7%	5.5%
Total	£2,816 M	£2,212 M	£2,497 M	£2,816 M	£2,676 M	£2,847 M	£3,177 M	-21%	13%	7.2%	6.4%	5.9%	5.4%

Notes: Above estimates are based on interviews conducted between the month of July and October 2020. CAGR stands for Compound Annual Growth Rate



### Lucintel Estimates are Validated by Talking to Major Players in Each Sector...(1/3)

Industry	Lucintel Estimates are Based on Primary Research
	The UK Aerospace Composites End Product Market of £888.9 Million in 2019 was estimated by talking to ~15 part fabricators in the
	UK aerospace composites market
Aerospace	• Two players from the industry validated the above market size and suggested that the Lucintel estimates of aerospace composites
Aerospace	part demand looks right to them
	• Interviews from major players suggested that the market will decline by more than 35% in 2020 due to COVID and the recovery rate
	will be slow. The market will reach to 2019 level by 2023 to 2025
	The UK Defence Composites End Product Market of £579 Million in 2019 was estimated by talking to ~10 tier 1 suppliers and OEMs in
	the UK defence market
Defence	• Two players from the industry validated the market size and suggested that the Lucintel estimates of defence composites part
	demand looks right to them and the market will not be much impacted by COVID in 2020
	• Example: One of the part fabricators said no significant impact of COVID in terms of orders for the Defence industry.
	The UK Automotive Composites End Product Market of £505 Million in 2019 was estimated by talking to more than 10 part fabricators
	• Two players from the industry validated the market size. Interviews from major players suggested that the market will decline by
Automotive	more than 30% in 2020 due to COVID and recovery rate will be slow
	• Example: Tier player said the Lucintel estimates on Automotive market of £500 M to £510 M for the UK composites seems correct,
	also the estimation of forecast for 2020-2025 seems okay



### Lucintel Estimates are Validated by Talking to Major Players in Each Sector...(2/3)

Industry	Lucintel Estimates are Based on Primary Research
Wind Energy	<ul> <li>The UK Wind Energy Composites End Product Market of £242 Million in 2019 was estimated by talking to two blade manufacturers/OEMs in the UK Wind Energy composites market</li> <li>Two players validated the market size and suggested that the Lucintel estimates of wind blade composites part demand looks right to them</li> </ul>
Construction	The UK Construction Composites End Product Market of £139 Million in 2019 was estimated by talking to ~10 part fabricators in the UK construction composites market • Four players from the industry validated the market size for their construction segments.
Marine	<ul> <li>The UK Marine Composites End Product Market of £194 Million in 2019 was estimated by talking to around 7 part fabricators and OEMs</li> <li>Major player from the industry validated the market size and suggested that the UK marine composites market is near about £200 million</li> </ul>



### Lucintel Estimates are Validated by Talking to Major Players in Each Sector...(3/3)

Industry	Lucintel Estimates are Based on Primary Research
Rail	<ul> <li>The UK Rail Composites End Product Market of £60 Million in 2019 was estimated by talking to more than 5 fabricators and OEMs in the UK rail composites market</li> <li>One of the railway composites part fabricators validated the market size and said that the Lucintel market size estimation seems to be at ball park range of £50-£60 million and predicted that the forecast for the next 5 years is about 4% in the UK rail composites market.</li> </ul>
Oil and Gas	<ul> <li>The UK Oil and Gas Composites End Product Market of £21 Million in 2019 was estimated by talking to ~5 part fabricators and OEMs in the UK Oil and Gas composites market</li> <li>One of the major players from the industry validated the market size and suggested that the overall UK composites demand in oil and gas application is about £20 million.</li> </ul>



### Voice of the Market on Forecast / Growth Rates: Industry Player Views were Summarized to Understand How Each Sector Growth Declined in 2020



Aerospace

"COVID had a huge impact on the UK aerospace business in 2020, with a 70% drop in air travel. At one point 90% of flights in Europe had been cancelled. **40% drop in build rate**. We anticipate a slow recovery with a minimum of 3-5 years to get back to pre-COVID levels" **Leading Aerospace OEM** 

"Aerospace business was expected to take significant downturn following COVID 19, as production was cut down due to factory shutdown and lockdown. We believe that demand is directly proportional to the production. Market is expected to have slow recovery growth and it will take quite long duration of four to five years to get back to normal growth level" Multi Industry, Part Fabricator



"Our company is mostly into manufacturing rail composite parts here in the UK. Market has impacted due to COVID 19 pandemic, but we believe that market is going to regain soon and expected forecast growth for the next 5 years is about 4% in the UK rail composites market" **Part Fabricator, Rail Industry** 

Rail



Defence

"The UK defence industry has no significant impact from COVID in terms of orders. We have long term contracts, with the main defence OEMs" Part Fabricator, UK Defence Industry



### The UK Composites Market Projection in Three Scenarios Considering End Market Growth

#### The UK Composites Market Projection (£M) in Three Different Scenarios



#### **Key Assumptions**

- In the most likely scenario, the composites market for various industries are likely to grow in pace with the industry.
- In the pessimistic scenario, a slowdown in economic activity is considered during the next 5 years and it is assumed that the market can experience similar trend as in last recession. Lucintel used economic model similar to the 2009 recession
- In the optimistic scenario, positive outlook towards most markets are considered such as government support in renewable energy, and aircraft, boat and automotive productions will grow at a healthy rate
- Covid-19 impact has been considered for the estimation and its impact has dragged down the market in 2020 as shown in the above figures



### UK Composites Market Scenario Analysis: Assumptions... (1/3)

Assumptions	Pessimistic Scenario	Most Likely Scenario	Optimistic Scenario
Aerospace			
UK annual aerospace part production growth (2019-20)	(46%)	(39%)	(31%)
UK annual aerospace part production growth CAGR (2020-25)	7%	10%	13%
UK annual aerospace part production growth CAGR (2025-30)	3%	3.4%	5%
UK annual aerospace part production growth CAGR (2030-35)	2%	3%	5%
Defence			
UK annual defence aircraft production growth rate (2019-20)	(8%)	(3%)	0%
UK annual defence aircraft production growth CAGR (2020-25)	3%	5%	7%
UK annual aerospace part production growth CAGR (2025-30)	2%	4%	7%
UK annual aerospace part production growth CAGR (2030-35)	2%	4%	6%
Probability / Impact of economic downturn	High	Moderate	Low
Wind Energy			
UK Annual wind installations growth (2019-20)	(2%)	4%	6%
UK Annual wind installations growth CAGR (2020-25)	1%	4%	6%
UK Annual wind installations growth rate CAGR (2025-30)	1%	4%	6%
UK Annual wind installations growth rate CAGR (2030-35)	2%	3.5%	5%
Average MW per turbine	5.0	5.0	6.0
Probability / Impact of economic downturn	High	Moderate	Low

Note: In above table (2019- 2020) is showing annual growth rates for the industry, and figures for (2020-25), (2025-30), and (2030-35) are compound annual growth rates



### UK Composites Market Scenario Analysis: Assumptions... (2/3)

Assumptions	Pessimistic Scenario	Most Likely Scenario	Optimistic Scenario
Automotive			
UK annual automotive production growth (2019-20)	(44%)	(31%)	(23%)
UK annual automotive production CAGR (2020-25)	6%	8%	12%
UK annual automotive production CAGR (2025-30)	3%	5%	6%
UK annual automotive production CAGR (2030-35)	3%	4%	6%
Probability /Impact of economic downturn	High	Moderate	Low
Rail			
UK annual passenger rail production growth (2019-20)	(12%)	(6%)	(3%)
UK annual passenger rail production CAGR(2020-25)	3%	6%	8%
UK annual passenger rail production CAGR (2025-30)	2%	5%	7%
UK annual passenger rail production CAGR (2030-35)	2%	4%	6%
Probability / Impact of economic downturn	High	Moderate	Low
Marine			
Annual recreational boat sales growth (2019-20)	(36%)	(31%)	(27%)
Annual recreational boat sales CAGR (2020-25)	6%	8%	10%
Annual recreational boat sales CAGR (2025-30)	1%	4%	6%
Annual recreational boat sales CAGR (2030-35)	1%	3%	5%
Probability /Impact of economic downturn	High	Moderate	Low

Note: In above table (2019- 2020) is showing annual growth rates for the industry, and figures for (2020-25), (2025-30), and (2030-35) are compound annual growth rates



### UK Composites Market Scenario Analysis: Assumptions... (3/3)

Assumptions	Pessimistic Scenario	Most Likely Scenario	Optimistic Scenario
Construction			
Annual construction spending growth (2019-20)	(18%)	(12%)	(9%)
Annual construction spending growth CAGR (2020-25)	6%	8%	10%
Annual construction spending growth CAGR (2025-30)	3%	6%	8%
Annual construction spending growth CAGR (2030-35)	2%	4%	6%
Probability /Impact of economic downturn	High	Moderate	Low
Oil & Gas			
Annual oil & gas infrastructure spending growth (2019-20)	(22%)	(17%)	(13%)
Annual oil & gas infrastructure spending growth CAGR (2020-25)	4%	7%	9%
Annual oil & gas infrastructure spending growth CAGR (2025-30)	2%	5%	7%
Annual oil & gas infrastructure spending growth CAGR (2030-35)	2%	4%	6%
Probability /Impact of economic downturn	High	Moderate	Low

Note: In above table (2019-2020) is showing annual growth rates for the industry, and figures for (2020-25), (2025-30), and (2030-35) are compound annual growth rates



### Most Likely Scenario: Major Industry Growth is Significantly Affected by COVID



•• Aerospace •• Defence •• Automotive •• Wind •• Marine •• Construction •• Rail •• Oil and Gas

Industry	Demand in 2019	Demand in 2020	Demand in 2021	Demand in 2025	Demand in 2035	Total Growth % (2019-20)	Total Growth % (2019-25)	CAGR % (2019-25)	Total Growth % (2019-35)	CAGR % (2019- 2035)
Aerospace	£889 M	£542 M	£664 M	£868 M	£1,094 M	-39%	-2.4%	-0.4%	23.1%	1.3%
Defence	£579 M	£560 M	£590 M	£703 M	£1,020 M	-3.3%	21.4%	3.3%	76.2%	3.6%
Automotive	£505 M	£356 M	£413 M	£551 M	£721 M	-29.6%	9.1%	1.5%	42.7%	2.2%
Wind Energy	£242 M	£255 M	£268 M	£323 M	£475 M	5.4%	33.7%	5.0%	96.5%	4.3%
Marine	£194 M	£137 M	£157 M	£205 M	£263 M	-29.6%	5.7%	0.9%	35.4%	1.9%
Construction	£139 M	£125 M	£143 M	£201 M	£301 M	-10.2%	44.9%	6.4%	116.9%	5.0%
Rail	£60 M	£57 M	£62 M	£77 M	£120 M	-5%%	29.2%	4.4%	100.7%	4.5%
Oil and Gas	£21 M	£18 M	£19 M	£24 M	£37 M	-15.9%	17.5%	2.7%	76.0%	3.6%
Others	£188 M	£165 M	£180 M	£224 M	£308 M	-12.5%	19.2%	3.0%	63.6%	3.1%
Total	£2,816 M	£2,212 M	£2,497 M	£3,177 M	£4,338 M	-21.4%	12.8%	2.0%	54%	2.7%



## Optimistic Scenario: Positive Growth in Various Industries, not just in Aerospace & Defence, with Faster Recovery



### Pessimistic Scenario: Aerospace, Automotive and Marine Growth Significantly Impacted due to COVID Pandemic, with Slow Recovery in All Industries

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### By Intermediate Type, Prepreg is Heavily Used. Multiaxial Fabric is Expected to Show a Higher Growth Rate due to Its Performance Benefits



Com	pound
-----	-------

Compound Annual Growth Rate %	2015-19	2019-25	2019-30	2019-35
CFT	8.1%	1.3%	2.5%	2.3%
Woven Fabric	7.8%	2.3%	3.1%	2.8%
Multiaxial	14.5%	4.4%	4.2%	4.0%
Prepreg	12.3%	1.5%	2.7%	2.5%
Others	5.9%	3.0%	3.4%	3.1%
Total	9.7%	2.5%	3.2%	3.0%

#### **Key Insights**

- Multiaxial fabric is expected to have a higher growth rate due to its  $\geq$ performance benefits compared to the woven textiles
- More than 15 intermediates companies in the UK, Hexcel and  $\geq$ Cytec are the major players


## Glass Fibre Represents >50% of the Reinforcement Market, while Carbon Fibre has Less Growth due to Slow Growth from Aerospace



CAGR	2015-19	2019-25	2019-30	2019-35
Glass Fibre	8.3%	3.4%	3.6%	3.3%
Carbon Fibre & Others	8.8%	1.9%	2.8%	2.6%
Total	8.5%	2.8%	3.3%	3.0%

Share of Composite Materials Demand by **Reinforcement Type in the UK: Trends and Forecast** 100 100 100 100 100 100 100 **←** 100% **59%** 59% 60% 60% 61% 61% 61% 41% 41% 40% 40% 39% 39% 39% 2015 2019 2020 2021 2025 2030 2035

Source: Lucintel analysis, Interviews

#### **Key Insights**

- In terms of reinforcement, glass fibre has higher usage mainly due to demand from the wind, automotive, and construction industries
- Carbon fibre has higher usage in the aerospace and defence industries
- Glass fibre is expected to remain the dominant material in the future



### Epoxy Resin has Dominant Share Representing >40% of the Composites Resin Market and will Remain Dominant in the Future as well



CAGR	2015-19	2019-25	2019-30	2019-35
Ероху	10.8%	4.0%	4.0%	3.8%
Polyester	6.1%	3.3%	3.6%	3.4%
Polypropylene	5.0%	3.0%	3.4%	3.2%
Polyamide	5.0%	3.0%	3.4%	3.2%
Vinyl Ester	10.0%	4.8%	4.6%	4.3%
Others	14.1%	6.2%	5.3%	4.9%
Total	7.9%	3.6%	3.8%	3.6%

## Share of Composite Materials Demand by Resin Type in the UK: Trends and Forecast



#### **Key Insights**

- Thermoset resin (Epoxy, UPR, and Vinyl ester) accounted for more than 80% share of the UK's total resin demand and is expected to remain the dominant resin type during the forecast period
- Epoxy represents >40% of the total resin market and is forecast to grow at ~4% in the next five years
- Thermoplastic resins (polypropylene and polyamide) is expected to have good growth in future in the automotive industry



## The UK has Good Capability to Produce Aerospace and Defence Parts. Automotive is the Largest Importer. Oil and Gas Exports Most of Its Productions

The UK End Product Domestic Demand, Import, Export and Production of UK Composites for Various Industries in 2019 (£ Million)



Source: Lucintel analysis, Interviews



### Definition of Demand, Domestic Production, Import and Export Terminologies Used in the Study

Terminology	Definition
Demand	<ul> <li>Any composites part that is made and assembled (part imported from other countries also included in demand) in the UK is considered as UK demand, irrespective of its final usage</li> <li>Example 1: If a composite wind blade manufactured by a UK manufacturer and is assembled in the wind turbine in the UK itself, then that wind blade is considered in the UK domestic demand</li> <li>Example 2: Composite parts for aircraft wing if made and assembled in UK itself, then those wing components are considered in the UK demand since it was consumed in UK even if the wing assembly is sent to other countries for final aircraft assembly</li> </ul>
Domestic Production	<ul> <li>Any composites part that is made in the UK is considered as domestic production</li> <li>Example 1: If any international company, such as MHI Vestas (headquartered in Denmark), produces wind blades in a UK plant, that is considered as domestic production</li> </ul>
Import	<ul> <li>If a company buys any composites part from other countries and uses them in the UK, it is considered an import</li> <li>Example 1: If an automotive component A is manufactured in other country and used in an assembly or in a car in the UK, then that part is considered as the import</li> </ul>
Export	<ul> <li>If a company is making any composites part in the UK and then exporting it to other country for assembly or final consumption, then that is considered an export</li> <li>Example 1: If a wind blade is manufactured in the UK and sent to other country for assembly in the turbine then it is considered as exports</li> </ul>



### Challenges Faced by Companies in the UK: Workforce Skills and Lack of Supply Chain are the Major Issues. COVID Has Been an Issue Since March

Degree of Challenge

Challenges Faced by Companies in the UK Composites Industry

the UK composites industry	Degree of		
	Low	High	
Gaps in the local supply base			1 <sup>st</sup>
Lack of government support			2 <sup>nd</sup>
Workforce skills			3rd
Competition from low-cost manufacturing countries			4 <sup>th</sup>
Low awareness among high volume industries like construction			5 <sup>th</sup>
Waste management issues			6 <sup>th</sup>

Source: Lucintel analysis, Interviews

Rank



#### **Voice of the UK Composites Companies on Challenges**

#### "Expect local supply chains to develop more strongly" Part Fabricator - Aerospace Industry

"Lack of government support to the turbine blade manufacturing companies. Mainly looking for government support in space related concern where we need more land to increase the blade size, which is a growing trend"

Part Fabricator - Wind Energy

"Supply chain is also a concern as there is so limited local content. EU anti-dumping duty on glass fibre from China" **Part Fabricator - Wind Energy** 

"Our primary request for government support would be for a focus on education to support skills in composites and manufacturing skills"

**Part Fabricator – Presence in Multiple Industries** 

"Would like to source raw materials more locally (ease of supply) but have gaps in structures. Working with local supply chains to try to develop capability • But need significant investment / government support • Engaged with ADS on supply chain development"

#### **Part Fabricator - Aerospace Industry**

"It's the OEMs that need to support the supply chain, invest in the latest manufacturing technologies, mirroring the practices in countries like Germany. Sadly, UK companies tend to be too short sighted and unwilling to take a longer-term view"

#### **Raw Material Supplier**

"Workforce skills were an issue, and this was exacerbated by the rural location of the factory. The interviewee estimated that 50% of the workforce was from Europe, due to a lack of skilled UK workers" **Part Fabricator, Construction and Automotive** 



### In the UK, Aerospace is the Largest Market, is Highly Impacted by COVID and Expects Slow Recovery in the Future



Aerospace

"The UK aerospace industry has huge demand for composites due to the need of more lighter, fuel-efficient aircraft. In 2019, the composites demand is this industry was around £800 to £900 million. COVID had a huge impact on the UK aerospace business in 2020, with a 70% drop in air travel. At one point 90% of flights in Europe had been cancelled. 40% drop in build rate. We anticipate a slow recovery with a minimum of 3-5 years to get back to pre-COVID levels" Leading Aerospace OEM



Construction

"We are one of the leading brands of GRP building components to the house-building and construction industry in the UK. The main GRP products that we produce include bay windows, dormers, windows, roofs, entrance doors, canopies, etc. We mainly use hand layup, spray layup and recently developed RTM capability. The construction composites demand in 2019 was lying in the range of £120 million to £150 million. The UK construction market growth for GRP products has been good at around 5% over the past five years and this is accelerating the projected growth for the next five years. There was a significant impact of COVID-19 on the direct to house builders market, certainly during the UK lockdown as building sites were forced to close. However, there was an upturn in the market via distributors, due to an increase in home renovation activities during lockdown"

Leading Part Fabricator, UK Construction Industry



### Not Much Impact of COVID in the UK Defence Industry and is one of the most Stable in the Pandemic Situation



Defence

"We supply composite panels for a range of military applications. The UK defence industry has no significant impact from COVID in terms of orders. We have long term contracts, with the main defence OEMs. This industry requires lots of pre-qualification process to enter, but once entered the business is steady. Market size is around £500 to £600 million in 2019"

Part Fabricator, UK Defence Industry



**Automotive** 

"We design and manufacture high value, low volume carbon fibre reinforced polymer composites. Your estimates of composites UK figures seems reasonable. The supply is very convoluted – there is a belief the price of materials and intermediates in artificially high (hidden within the complex supply chain) and needs to be worked on" **Part Fabricator, Automotive Industry** 



"We are one of the leading suppliers of composite products in the oil and gas industry. We have a complete production base in UK only. If you talk about the total demand for composites in this sector domestically it's very small and lies between £15 to £25 million. For the next five years the market will witness growth of 2% - 3% but nothing substantial "**Part Fabricator, Oil & Gas Industry** 

Oil and Gas



### Composites Demand in the Marine Industry Declined due to COVID and is Expected to have Slow Recovery in the Future



"We mainly manufacture composite parts in the UK only; some parts we import from Europe. The demand for composites in the marine industry for 2019 was between £190 and £210 million. The market has seen a decline in 2020 due to the COVID pandemic, and is expected to have a slow recovery in the future" Leading Marine Part Fabricator / OEM

Marine



"Our company is mostly into manufacturing rail composite parts here in the UK. Market size is estimated to be £50-£60 million. The forecast growth for the next 5 years is about 4% in the UK rail composites market" **Part Fabricator, Rail Industry** 

Rail



### Summary of the Opportunities in the UK Composites Industry

- The UK has more than 400 composites companies and high capability in resin, prepreg, aerospace, defence, rail, construction, marine, and O&G composites parts manufacturing
- The UK composites end-product market in 2019 was estimated at £2.8 billion, which is expected to grow at 2.7% CAGR to reach £ 4.3 billion by 2035
  - The four major industries driving the use of composites are aerospace, defence, automotive, and wind, constituting 79% of the total UK composites market
  - COVID has impacted heavily the growth of the UK composites industry where aerospace and automotive were hit hard, contracting by about 40% and 30%, respectively in 2020
  - Wind energy is least impacted by COVID, and is expected to experience 5% growth in 2020
- The UK produces ~£2.5 billion in composite parts, of which ~17% is exported to both EU and non EU countries. ~26% of composites parts are imported to satisfy the UK domestic demand, of which the automotive market is the largest importer
  - <sup>-</sup> The UK has good hold in intermediate materials, but is highly dependent on imports for certain raw materials
  - The UK needs to grab the wide export opportunity in order to grow and increase its share in the global composites market
- The major challenges are: COVID-19, OEM preference for purchasing raw materials from other countries, lack of supply base, low skill workforce, and competition from low-cost manufacturing countries



### **Table of Contents**

- Executive Summary
- The UK Composites Supply Chain Analysis
- Opportunities in the UK Composites Industry
- Deep Dive in the Five Key Markets
- Recommendations





Note: Bubble size represents market size in 2035

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### The UK has Strong Domestic Capability in the Aerospace and Defence Industries, whereas High Dependency on Imports for Automotive



**Demand Definition:** Any composites part that is made in the UK and assembled (part imported from other countries also included in demand) in the UK itself is considered in the UK demand

**Import Definition:** If a company buys any composites part from other country and assembling and the using the complete system in the UK is referred as import

### Export Value in Total Composites Domestic Production in the UK for 2019 (£ M) 895 605



**Domestic Production Definition:** Any composites part that is made in the UK production facility of a company, even if the company has no origin in the UK is considered as a domestic production

**Export Definition:** If a company is making any composites part in the UK and then exporting it to other countries for assembly or final consumption, then that is considered as exports



# Composites Per Capita Consumption is about Three Times Higher in the USA Compared to the UK. In Wind, the UK has Higher Per Capita than the USA

Composites Consumption Per Capita (Ibs./Capita): UK vs. USA



#### GDP Per Capita (£/Per Capita) 2019

Note: Bubble size represents total composites demand in 2019

Source: Lucintel

Countries	Composites Consumption M Ibs 2019	GDP in £ Billion (2019)	Population in Million (2019)
UK	6516	16,244,240	328
USA	397	2,148,520	66.9

Composites Consumption Per Capita (Ibs./Capita) by Industry in 2019



#### **Key Insights**

- Composites penetration in the UK market is low as compared to USA
- To gain more market share in the global composites industry, the UK market can increase cost competitiveness
- High labour and energy costs increase the overall production cost in the UK



### **Aerospace Industry**



### Composites Used in the UK Aerospace Industry are Expected to Grow with Increase in Deliveries from Airbus

#### The UK Aerospace Composites End Product Market Opportunity (£M) £M



UK Aerospace Composites Demand

#### Capability/Strength

- Strong manufacturing base for wing components for Airbus, where the UK is responsible for assembly of its commercial aircraft wings
- Highly competitive industry with all the desired capabilities, such as skilled workforce, advanced technologies, and state of art facilities

#### Gaps/Weakness

Interviews

- High dependency on the aerospace industry for composites growth in the UK. Aerospace is >30% of total market
- Largely dependent on imports of raw materials, such as aerospace grade carbon & glass fibre

#### Import and Export in the UK Aerospace Composites Market



"In the future, the demand for composite materials is expected to increase in aerospace due to fuel efficiency needs" Leading Aerospace Part Fabricator

"In 2019, the composites demand in this industry was around £800 to 900 million. COVID has a huge impact on the UK aerospace business and we anticipate a slow recovery with a minimum of 3-5 years to get back to pre-COVID level" Leading Aerospace OEM

Note: UAM is not incl. in Aerospace Market

### Future Airbus Deliveries of Commercial Aircraft Wings & Components Manufactured and Assembled in the UK Will Drive Composites Demand



#### Global Airbus Aircraft Deliveries: 2019 – 2035

Note: Wing components of major Airbus commercial aircraft such as A320, A330, A350, A380 are made in the UK and so global Airbus commercial aircraft deliveries are considered here as a demand driver Source: Lucintel analysis, Airbus

#### **Key Insights**

- The UK is a hub of composites wing component manufacturing for Airbus commercial aircraft
- With the increasing demand for Airbus commercial aircraft, the demand for composites in the UK aerospace will increase
- Production shutdown and travel ban due to COVID pandemic has highly affected the UK aerospace composites demand in 2020

"COVID has had a huge impact on the UK business. 70% drop in air travel. At one point 90% of flights in Europe had been cancelled. 40% drop in build rate. The company has been developing various scenarios to plan for the future. They anticipate a slow recovery with minimum of 3-5 years to get back to pre-COVID levels. So 2023 to 2025 for recovery" Leading Aerospace OEM



### The UK has Strong Foothold in the Aerospace Industry, with all Major OEMs and Tier Players Present



Presence in the US and UK							
Countries	Airbus	Boeing	Bombardier (Acquired by Spirit-2020)	Bell	Embraer		
	$\checkmark$	★ (R&D Only)	$\checkmark$	×	×		
	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$		

Source: Lucintel, Annual Reports



Source: Lucintel, Annual Reports



## The UK has Good Capability in Intermediate Materials & Part Manufacturing in Aerospace. Demand is Met Mostly by Domestic Production

Aerospace Value Chain	Raw Material	Intermediate	Tier Players	OEMs	
UK	<ul> <li>Very limited number of ra material suppliers and demand is mostly fulfilled by imports</li> </ul>	• Major prepreg manufacturers, such as Hexcel and Cytec Solva are present satisfying domestic demand	<ul> <li>Major tier players are present in the UK, suc GKN, Spirit, Aernnova Meggit, supplying par major OEMs</li> </ul>	<ul> <li>Airbus wing assembly</li> <li>Boeing R&amp;D</li> <li>Bombardier</li> </ul>	

Aerospace Value Chain	Raw Material	Intermediate	Tier Players	OEMs	
USA	<ul> <li>Strong presence of major suppliers such as Toray, To Teijin, Hexcel, Huntsman, e</li> </ul>	• All the major players such as Hexcel, Cytec Solvay, etc. have manufacturing bases	Major tier players have manufacturing bases in the USA	<ul> <li>Boeing</li> <li>Airbus</li> <li>Bombardier</li> <li>Embraer, etc.</li> </ul>	
				Source: Lucintel	

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Value Chain Strength

Poor Mod

Moderate

Good



### Value Creation from Materials to Composite Parts Fabrication in Aerospace is About 6.0 Times. Composite Parts Represent Fraction of Aircraft Cost



"We are producing the composite wing parts for various aircrafts, using prepreg material and using automated fibre placement technology with consistent high quality and as little manual work as possible. It would not be possible for us to share the exact details on part weight and cost, due to commercial sensitiveness, but your estimations on value creation from prepreg to part fabrication of 6 to 7 times seems correct"



### The UK Aerospace Industry Has Good Supply Chain Strength in Composites Intermediates and Part Fabrication, and Offers Moderate Export Opportunity

Competitive Strength in Aerospace	Fibre & Resin	Intermediates (Fabrics & Prepreg)	Part Fabrication
Technical Strength of Domestic Players Compare to International Players	Low	Moderate	Moderate to High
Workforce Skill Set compared to International Workforce	Low	Moderate	Moderate to High
Cost Position (Overhead Cost, Material Cost, Overall Cost of Production)	Low	Moderate	Low
Trends in Competitiveness			
Drivers for Future Competitiveness	Drive investment by global players, provide required assistance to enable scalability & profitability	Leverage existing know-how and explore new export opportunities	Drive investment, invest in new technologies, low-cost manufacturing
Overall Assessment	Limited suppliers in glass and carbon fibre. Import Dependent	Good Expertise, Good Export Opportunities	Good Potential, Good Export Opportunities

Source: Lucintel analysis, Interviews



### To Drive Growth in the Aerospace Composites Market, UK Can Leverage Existing Strong Engineering Expertise & Part Fabrication Capabilities to Increase Exports

Leverage Engineering Capabilities for Export

Develop New Materials and Technologies

**Develop Leadership in UAM** 

**Strategic Considerations to Drive Growth in Aerospace Composites** 

- The UK could leverage its existing strong engineering expertise, and advanced composite parts manufacturing capabilities to increase export opportunities in aerospace. They can also develop capabilities to minimize their reliance on imports of certain parts.
- Aircraft OEMs, want to move away from prepreg because it is expensive and requires cold storage and autoclave. Therefore, industry players need to invest in new materials and automated processes with the goal to lower the cost of composites whilst improving performance. Investment in non-prepreg based technologies with the goal of better weight saving and other performance benefits will be the key.
- Invest in better material systems such as smart materials, 3D reinforcement, fibre sizing, fibre orientation, and new resins for the next generation technologies and aircrafts. Other than bearing structural loads, future materials need to be multifunctional with properties such as self-healing, health monitoring, acoustic damping, and energy harvesting.
- UAM (Urban Air Mobility) will be the next big thing for future mobility to reduce traffic congestion in urban areas. The UK has strong engineering and composite parts fabrication capabilities in aircraft and high-end cars, which they could leverage to achieve a leadership position in eVTOL air taxis, drones, etc.

Note: The above strategic perspectives are sum up of views obtained by companies in the primary interviews



#### UK could Strongly Leverage its Existing Engine & Composites Part Development Capabilities to Gain Strong Leadership in the Global UAM Market



"We are expecting an annual production of more than 1,000 UAMs per year from 2035. Average composites weight per UAM is expected to be around more than 500 kg. We are going to produce and procure all components locally."

#### **UAM Manufacturer**

#### **Current Situation**

#### UAMs in the UK are currently under development and are awaiting 1<sup>st</sup> commercial flight in 2024 – 2025

- In terms of eco system, Vertical Aerospace & VRCO are developing UAMs, while GKN & Airborne are developing parts and Rolls Royce is developing engines for UAMs
- Majority of the structural & non-structural parts are to be made of composites for UAM and are expected to be locally produced & procured, driving composites demand in the UK

#### **Future Outlook**

- In the short term, there are limited opportunities in UAM. However, demand for UAMs is forecast to reach 25,000 / year by 2035 at global level
- In UK, demand for UAMs can become a significant driver for composites parts, with preliminary estimates of >£700 M / yr. by 2035
- UAM is shaping the future of mobility. It's one of the top mega-trends in mobility and in composites
- UK can leverage its strong composite parts production capabilities in the aerospace and auto racing markets to compete in the global UAM market

Note: Above forecast can be altered by various factors, since UAM is at nascent stage of development



### **Defence Industry**



### Increasing Usage of Composites in the UK's Defence Industry and Strong **Technological Capability Driving Composites Demand**







- £M 1,500 1,020 858 1,000 703 579 500 238 0 2019 2025 2030 2035 2015 **UK Defence Composites Demand Capability / Strength Gaps / Weakness**
- Presence of strong defence OEMs in the UK, such as BAE and Leonardo
- Strong supply base for defence grade prepreg materials
- plans for unmanned Future aircraft with more usage of composites

- Security of supply for raw materials is one of the major gaps in the supply chain
- Production cut for F-35 due to COVID and A400 due to technical glitch

"COVID has not affected the UK defence industry, as our main focus is on military contracts, which have remained the same" Leading Defence OEM

"Estimations on the market to be around £500 to £600 million in 2019 seem to be accurate"

Part Fabricator, UK Defence



### The UK Defence Industry is Strong, with Good Presence of Major OEMs and Tier Players in the Region

**Global Top Defence OEM Revenue 2019** 100 <sup>£</sup> <sup>B</sup> 62 60 47 26 23 12 0 Lockheed Northrop **Raytheon Bombardier** Airbus Boeing Martin Grumman

Presence in the US and UK							
Countries	AirbusBoeingRaythe onLockheed MartinNorthrop GrummanBombardier						
	$\checkmark$	X (Service support only)	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	
	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	



#### **Global Top Composites Tier Player Revenue 2019**

Presence in the US and UK							
Countries	S UTC GE Aviation Safran BAE Aerospace Rolls Royce Melrose Spirit						
	$\checkmark$	×	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$

Source: Lucintel, Annual Reports



### The UK has a Strong Defence Industry like USA, but is largely Dependent on Other Countries for Raw Materials

Defence Value Chain	Raw Material	Intermediate	Tier Players	OEMs	
UK	<ul> <li>Very limited number of suppliers and demand is mostly fulfilled by import</li> </ul>	Hexcel is the major player in terms of prepreg and resin suppliers	<ul> <li>Major OEMs like BAE are backward integrate to make components</li> <li>Strong international partnerships</li> </ul>	d • Major OEMs present in the UK, but one or two players are dominating the industry, i.e. BAE, Lockheed mainly	

Defence Value Chain	Raw Material Intermediate		Tier Players	OEMs <ul> <li>Big defence OEMs like Lockheed, Raytheon,</li> <li>Northrup are present in the US, using composit in high volume</li> </ul>	
USA	<ul> <li>Strong presence of major suppliers such as Hexcel, Cytec, Toray, Toho Teijin</li> <li>All the major players have manufacturing base in the USA</li> </ul>		Major players are present in the industry to support and supply parts to defence OEMs		

Source: Lucintel

Value Chain Strength

Poor Moderate

Good



### The UK Defence Industry Has Good Supply Chain Strength in Composites Intermediates and Part Fabrication, and Offers Moderate Export Opportunity

Competitive Strength in Defence	Fibre & Resin	Intermediates (Fabrics & Prepreg)	Part Fabrication	
Technical Strength of Domestic Players Compare to International Players	Low	Moderate	Moderate to High	
Workforce Skill Set compared to International Workforce	Low	Moderate	Moderate to High	
Cost Position (Overhead Cost, Material Cost, Overall Cost of Production)	Low	Moderate	Low	
Trends in Competitiveness				
Drivers for Future Competitiveness	Drive investment by global players, provide required assistance to enable scalability & profitability	Leverage existing know-how and explore new export opportunities	Drive investment, invest in new technologies, low-cost manufacturing	
Overall Assessment	Limited suppliers in glass and carbon fibre. Import driven	Good Technological Know How, Good Export Opportunities	Good Expertise, Good Export Opportunities	
			Source: Lucintel analysis, Interviews	

www.lucintel.com



### Value Creation from Intermediate Material to Composite Part Production in the Defence Industry is About 6.4 Times. Composite Parts are Fraction of Total Aircraft Cost



"The defence industry is a highly sensitive industry and a lot of information sharing to third parties is very sensitive. Composites is the material of choice in UK manufacturing for aerospace & defence, due to the low-weight requirement. Your estimations on value creation from intermediate to part production is quite close"

#### Major Part Fabricator and OEMs, UK Defence



### To Drive Growth for Composites in Defence, Leverage Existing Intermediates & Part Fabrication Capabilities to Increase Exports

The UK can Leverage its Strong Engineering Capability for Development of Indigenous Program

Promote New Technology Developments for Increasing Competencies

Collaborate and Create Influence

#### Strategic Considerations to Drive Growth in Defence Composites

- The UK remain a significant exporter of defence capability and can maintain the same position by leveraging the fastest development of indigenous combat aircraft, by bidding at international defence programs
- Investments to increase competencies in advanced future technologies
- Invest in better material systems such as smart materials, 3D reinforcement, fibre sizing, fibre orientation, and new resins for the next generation technologies
- Work with companies to provide training on composites manufacturing, provide on-job training and apprentice programs
- The UK defence industry plays a vital role in maintaining UK's influence in the global market and its relationships with allies. UK could invest in expanding production capacity by providing grant/low interest loans to companies to invest in new equipment to keep pace with ongoing technological advancements, encourage innovations to compete well with international competition

Note: The above strategic perspectives are sum up of views obtained by companies in the primary interviews



### **Automotive Industry**



The UK Automotive Composites End Product Market Opportunity (£M)



UK Automotive Composites Demand

#### Capability/Strength

- Major automotive OEMs, such as JLR, McLaren, and Nissan are present in the UK and are more inclined towards the use of composites
- Technology know-how and state of art manufacturing for high-end automotive companies

#### Gaps/Weakness

Interviews

Source: Lucintel analysis,

- Lack of high-volume composite part fabricators in the UK, due to high cost of production in the country
- Low presence of low-cost raw material suppliers
- Shortage of skilled workforce

#### Import and Export in the UK Automotive Composites Market



"Composites have their strongest demand coming from the high-end automotive motorsports sector, whereas other high-volume automotive products are mostly imported and market demand is estimated to be in between £450 to £550 million"

#### Part Fabricator, Automotive



### The UK Automotive Industry Negatively Impacted by COVID Pandemic in 2020, but Expected to Recover in the Next 4-5 Years

The UK Automotive (Car) Production in Million Units (Million Units): 2019 – 2035



#### **Key Insights**

- The UK automotive industry is expected to regain back to current production rate in the next five years by growing at a CAGR of ~8% from 2020 to 2025
- BREXIT concerns were already affecting the UK automotive industry in the last three to four years, whereas the drop in 2020 was due to COVID outbreak

"We are one of the leading composite part manufacturer for automotive industry and mainly developing parts for Bentley, JLR, McLaren, Aston Martin and many UK based OEMs. UK automotive production will drive the composites demand and your future growth projections looks fine"

Leading Automotive Part Fabricator



### Limited Number of Global Car Makers & Tier 1/2 Players Manufacturing in the UK, But the Sector has Significant Domestic Players in the Automotive Supply Chain



Presence in the US and UK						
Countries	Volkswagen	Toyota	Ford	Fiat	BMW	GM
	×	$\checkmark$	×	×	$\checkmark$	×
	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$

Note: Presence of companies here is considered based on their composites activity

Source: Lucintel, Annual Reports

70

#### **Global Top Composites Tier Player Revenue 2019**



Presence in the US and UK						
Countries	Magna	Johnson Control	Faurecia	Valeo	Mahle	Delphi
	×	×	×	×	×	$\checkmark$
	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$

Source: Lucintel, Annual Reports



### Automotive Industry Value Chain Lacks Strong Raw Materials & Intermediates Capability, which Could Attract More Tier Players and OEMs

Value Chain UK	Raw Material	Intermediate	Tier Players	OEMs
	<ul> <li>Very limited number of suppliers and demand is mostly fulfilled by import</li> <li>Very limited number of suppliers and demand is mostly fulfilled by import</li> </ul>	<ul> <li>Very limited</li> <li>of</li> <li>number of</li> <li>suppliers and</li> <li>demand is</li> </ul>	<ul> <li>Formula and High-End Cars:</li> <li>OEMs have good in-house capabilities. They also import parts as well as buy from domestic players.</li> </ul>	Formula & High End Cars: • Major players are present such as McLaren, Lotus, Aston Martin, Bentley, etc.
		<ul> <li>High volume cars:</li> <li>OEMs rely heavily on imports for high-volume parts</li> </ul>	High volume cars: • Lack of major OEMs. Few players such as JLR present.	

Value Chain USA	Raw Material	Intermediate	Tier Players	OEMs	
	<ul> <li>Strong presence of major suppliers such as Owens Corning, Hexcel, Cytec Solva JM, Jushi, Toray, Teijin, Huntsman, Reichhold, etc.</li> </ul>	y, • All the major players have manufacturing bases in the USA	Strong relationships between part fabricators and OEMs	Big automotive OEMs like Ford, GM, Toyota, Volvo, Honda, BMW, Mercedes, etc. are present in the US	
	Value	Chain Strength Poor	Moderate Good	Source: Lucintel	



### The UK Automotive Industry Mainly Import Driven and Needs to Enhance its Capabilities Across the Supply Chain to Ensure Competitive Low-Cost Manufacturing

Competitive Strength in Automotive	Fibre & Resin	Intermediates (Fabrics, Compounds, & Prepreg)	Part Fabrication
Technical Strength of Domestic Players Compare to International Players	Low	Moderate	Moderate
Workforce Skill Set compared to International Workforce	Low	Moderate	Moderate
Cost Position (Overhead Cost, Material Cost, Overall Cost of Production)	Low	Low	Low
Trends in Competitiveness			
Drivers for Future Competitiveness	Low-cost carbon fibre, development of recycled carbon fibre	Low cost prepreg	Design capability, low-cost manufacturing
Overall Assessment	Limited suppliers in glass and carbon fibre. R & D programmes needed to address recyclability	Limited presence of international players, Ensure availability of materials	Good Domestic Capability for High End Cars, Limited Capabilities for High Volume Production
			Source: Lucintel analysis


### Value Creation from Raw material to Composite Part Production is ~3 Times



"Yes, we are using composite-made underhood structural parts in our high-end cars. The high-end automotive industry is a highly sensitive industry, and it is really difficult to share the details on part weight and cost. But calculated value creation seems correct" Leading Automotive OEM



### The UK has Good Supply Chain and Composites Capability in Formula 1 and High-End Cars, but Lacks Automated Technologies for Mass Production

### The UK Composites Capability in Various Automotive Segments



Formula Car Segment

- Leading formula car manufacturers in the UK, McLaren and Mercedes AM Petronas, use composites parts such as monocoque chassis, suspension, engine covers and body panels. Part production technologies primarily used are RTM and prepreg
- The UK can encourage companies to develop and manufacture more lightweight parts, such as battery housings for formula electric cars
- New technologies which can help with faster production capabilities and in the development of highperformance parts can be the game changers for formula cars



#### **High End Car Segment**

- The UK has major globally known high end car manufacturers, such as Bentley, Aston Martin, Lotus, and Jaguar Land Rover, which all now extensively use composites for applications such as interior parts, splitters, covers and body panels to reduce overall weight
- The UK has good capability to produce high end parts where cost is not a major concern
- Interviews with players suggest additive manufacturing and development of graphene and related nanomaterials for composites can be a game changing technology, if it could be achieved



#### **Passenger Car Segment**

- Currently in the UK, there is limited usage of composites in high volume passenger cars and light commercial vehicles. This is attributed to the high price sensitivity of mass volume cars, combined with a lack of sufficient automated technologies being used in the UK for the production of cost-sensitive high volume composite parts
- The UK needs to develop more cost competitive part fabrication capabilities, increase awareness about composites, and promote strategic alliance between players to attract greater future use of composites in passenger car segments
- UK companies can adopt more automation to reduce labour cost and cycle times to produce high volume parts



# To Drive Growth for Composites in Automotive, Leverage Strong Engineering Capabilities for the High-End Segment, and Promote Usage of New Technologies for Mass Volume Production in the UK

**Strategic Considerations in the Automotive Composites Market** 

- In the UK, composite part manufacturers supply parts mainly for 3 types of cars: (1) Formula 1 (2) High-End Premium Cars (3) Mass market passenger cars & light commercial vehicles
- In Formula 1 and high-end premium cars, the UK suppliers have strong engineering capabilities for part production
- New technology development, which can help in faster production and in development of high-performance parts, can be the game changer for high end and formula cars
- For mass market vehicles, there is a need for cost-competitive part fabrication capability with low labor involvement in part fabrication
- Encourage strategic alliances between various nodes of the value chain to promote more usage of composites in the automotive industry
- Work with companies to provide training on composites manufacturing for mass production, provide on-job training and apprentice programs

Note: The above strategic perspectives are sum up of views obtained by companies in the primary interviews

Develop Capabilities for Cost Competitive Production

Promote Strategic Alliance and Workforce Training



## Wind Energy Industry

# Wind Energy: The UK Govt.'s Plan to Significantly Increase Wind Turbine Installation Particularly Offshore Wind is Driving the Composites Usage

#### The UK Wind Energy Composites End Product Market Opportunity (£M)





Source: Lucintel analysis, Interviews

#### Import and Export in the UK Composites Wind Energy Industry



### Capability/Strength

- Strong focus on offshore wind market growth by the UK government
- Presence of major players in the UK market, such as Siemens Gamesa, MHI Vestas
- Interest from other major players to invest in the UK, such as LM Wind Power

### Gaps / Weakness

- More dependency on imports from low-cost countries like China
- Lack of space is the major concern of already-established players in the market

"Composites demand in the wind industry is expected to grow in the future, as the offshore wind energy sector has high potential to grow. Raw materials are mainly imported from other countries, due to the low cost. Wind energy projects are mainly dependent on the project win basis. The market estimates for wind energy in the UK in 2019 was about £230 million - £250 million"

Leading Part Fabricator, Wind Energy

# The Wind Energy Industry is Unimpacted by COVID-19. In the UK, Composites Demand Grew in 2020 in line with the Growing Offshore Wind Energy Market



#### UK Wind Turbine Annual Installation in MW: 2019 – 2035

#### **Key Insights**

- The UK wind energy industry has had not much impact of the COVID pandemic, and companies were shut for a shorter period of time
- the UK government's target for having 40GW of Offshore wind installation by 2030 is driving the demand for composites in the UK wind energy industry

"We have seen an impact of the pandemic and our factories were shut for shorter period of time, but we resumed production in few weeks with proper guidelines followed. UK government set target for offshore installation to 40 Gigawatt by 2030 will drive composites demand in the future"

Leading Wind Blade Manufacturer / OEM



### **Despite Good Demand, Wind Energy Players are Importing Materials due to Absence of Volume and Low-Cost Suppliers in the UK**

Wind Value Chain UK	Raw Materials	Intermediate	Tier Players	OEMs	
	<ul> <li>Major tier players are importing raw materials, as they follow centralized purchasing procedures</li> </ul>	Major tier players are importing intermediate materials	• Few of the major players are present: Siemens Gamesa, MHI Vestas, Exel, etc.	<ul> <li>Siemens Gamesa</li> <li>MHI Vestas, etc.</li> </ul>	

Wind Value	Raw Materials	Intermediate	Tier Players	OEMs	
	<ul> <li>Strong presence of major suppliers, such as Owens Corning, JM, Jushi, Olin, Huntsman, Reichhold, etc.</li> </ul>	All the major players     have their manufactu     bases	<ul> <li>Major tier players have their manufacturing bases in the USA</li> </ul>	<ul> <li>GE</li> <li>Siemens Gamesa</li> <li>Vestas</li> </ul>	
	Value Cl	nain Strength Poor	Moderate Good	Source: Lucintel analysis	

**Note:** Though the UK has less presence of raw material suppliers, investment in developing supply base for raw materials would be a risky business proposition, as major OEMs and blade manufacturers have central purchasing procedures. Therefore, value chain strength is marked as moderate above.

Poor

Moderate

Good



# Wind Energy Industry Cluster: The UK has Major Wind OEMs and Promising Offshore Market Growth is Attracting More Companies in the UK





Presence in the US and UK						
Countries	GE Wind	MHI Vestas	Siemens Gamesa			
	×	$\checkmark$	$\checkmark$			
	$\checkmark$	$\checkmark$	$\checkmark$			

Source: Lucintel, Annual Reports

Note: Most of the turbine manufacturers are engaged in wind blade manufacturing for in-house purposes



### Overall Value Chain Assessment: Need for Production Plant with Capacity of Producing Higher Length Wind Blades

Competitive Strength in Wind	Fibre & Resin	Intermediates (Fabrics & Prepreg)	Part Fabrication
Technical Strength of Domestic Players Compare to International Players	Low	Moderate	Moderate
Workforce Skill Set compared to International Workforce	Low	Moderate	Moderate
Cost Position (Overhead Cost, Material Cost, Overall Cost of Production)	Low	Low	Low
Trends in Competitiveness			
Key Drivers of Future Competitive Position	Drive investment throughout the sup suppliers into t	ply chain, support entry of UK-based he wind sector	Larger size wind blade production
Overall Assessment	UK has working more towards modular blade manufacturing	Limited presence of international players	Identify clusters that may facilitate development of larger wind blades

Source: Lucintel analysis, Interviews



### Wind Energy: Value Creation from Raw Materials to Wind Blade Composites Part Production is ~2.7 times

		£200,000 -£230,000	~2.7X	£580,000- £	620,000	
	Raw Materials Cost (Fabric+ Epoxy Resin)			Wind Blade Cost (3 blades) Source: Lucintel analysis, Interviews		
Part considered in the study	Average part cost (£)	Material cost (Fabric + Resin) in three wind blades (£)	Value creation (from fabric to part)	Wind turbine cost (£ M)	Contribution of these wind blades in overall wind turbine cost (%)	
Wind Blade (75 meter long, 5MW) Weight -25,000 - 35,000 kgs / blade	£580,000 - £620,000 (3 blades)	£200,000 - £230,000 (3 blades)	~2.7	3.8 - 4.2	10% - 12%	

"We are one of the leading large turbine blade manufacturers in the UK. The value creation from the intermediate materials used, that is fabric and resin to end part production, is around 2 to 3 times."

Leading Part Fabricator and OEM, Wind Energy Industry



# To Drive Growth for Composites in the Wind Industry, Improve Facilities to Manufacture Larger Sized Blades and Provide Govt. Support to Companies

Develop Competencies that Support Manufacturing of Large Sized Blades

Leverage Opportunity of Planned Growth of UK Offshore Wind Industry

Support Industry through Government Incentives & Apprenticeship Programs

#### **Strategic Considerations to Drive the Wind Energy Composites Market**

- UK has already started working in the area of modular blade manufacturing
- Support companies to improve facilities to manufacture larger sized blades by providing larger space and reduce bureaucracy
- Encourage and support establishment of larger turbine blade design and manufacturing
- The UK government's set target for 40 Gigawatt offshore installation by 2030 will drive composites demand in the future and companies could leverage this opportunity
- The government can closely work with companies to understand issues in local procurement and could provide solutions. Work with companies to provide training on composites manufacturing, provide on-the-job training and apprentice programs.
- Support entry of UK-based suppliers into the wind sector. Identify clusters that facilitate development of larger wind blade manufacturers.

Note: The above strategic perspectives are sum up of views obtained by companies in the primary interviews



# **Construction Industry**



### Construction Industry in 2019 Accounted for ~5% of UK Composites Demand

								and Fore	casi					
	2 946			3,177	3,858	4,338	100 <mark>6%</mark>	100 <mark>5%</mark>	100 <mark>6%</mark>	100 <mark>6%</mark>	100 <mark>- 6%</mark> -	100 <mark>- 6%</mark> -	100 <mark>- 7%</mark> - 1	<b>└── 100%</b>
1,825	2,010	2,212	2,497				94%	95%	94%	94%	94%	94%	93%	
2015	2019	2020	2021	2025	2030	2035	2015	2019	2020	2021	2025	2030	2035	_
						<mark>cor</mark>	nstruction 📃 Ot	hers			Source: I	_ucintel analy	ysis, Intervie	ews
							Key Insights							

#### UK Construction Composites Part / End Market Demand: Trends and Forecast (£ M)

Compound Annual Growth Rate %	2015-19	2019-25	2019-30	2019-35
Construction	7.5%	6.4%	5.4%	5.0%
Others	11.7%	1.8%	2.8%	2.6%
Total	11.5%	2.0%	2.9%	2.7%

The UK has a presence of a number of small- to mid-sized composites part fabricators in the construction industry.

Share of Industries in the UK Composites Market: Trends

and Eaveraget

- Some of the major composites construction companies are Epwin Group, Kingspan, Filon Products, Chester Composites, Anglia Composites, AM Structures, Pultrex, etc.
- Demand for composites part delayed due to COVID lockdown but demand is expected to pick up, with residential and infrastructure building activities returning to planned levels. UK Government focus on infrastructure development will help construction sector recovery and growth.



### **Voice of UK Construction Composites Companies on Challenges**



"Limited Focus on Small Industries. There is too much focus on aerospace and high-end carbon-fiber reinforced, epoxy resin-based composites amongst UK government policymakers. They like high-end industry and ignore the high volume, mass market composites industry." **Raw Material Supplier** 



"Clients are still not familiar with the advantages of composites materials – lack of education on what composites can do amongst the user group is still the major challenge and barrier for growth in the construction industry. There are many nodes to the construction industry supply chain and each node has its own agenda, this can make it difficult for a new technology / new material to gain high levels of market penetration."

"Obtaining skilled people is a concern. Cannot find people with composites capability - need to train in-house."

Part Fabricator, Construction Industry



"Industry Standards – this was the biggest challenge for the company. Convincing OEMs that composite materials could do everything that conventional materials could do and add value." Raw Material Supplier, Construction Industry

"COVID-19 has a high impact on workforce morale as shift patterns where heavily disrupted. Large order book impact earlier this year, down by 80% in the month of April. This has now recovered with order book returning to normal. However, we are very nervous of the future and further shutdowns would seriously impact the business." Leading Part Fabricator, Construction Industry



"The company has different routes to market: 1. Direct to house builders 2. Via distributors. There was significant impact of COVID-19 on the direct to house builder market, certainly during the UK 'lockdown', as building sites were forced to close. However, there was an upturn in the market via distributors – due to increase in home renovations and DIY activity during lockdown."

**Construction Industry, Part Fabricator** 



### Supply Chain is Good for Construction in the UK Composites Industry to Meet Local Demand

Industry	Major Composites Parts Manufactured	Major Raw Materials Used	Major Technologies Used	Supply Chain Strength	Export Capability
	Gratings				
	• Window and door				Moderate capability in
	profiles				export
	Claddings	<ul> <li>Glass fiber with</li> </ul>		Technology know-how	Pultruded products
Construction	Pultruded	polyester resin	Pultrusion	Number of small companies	are generally high-
	components	/ vinyl ester		satisfying local demand	volume and are easily
	• Tunnel				exported to other EU
	reinforcement plates,				countries.
	etc.				



Source: Lucintel analysis, Interviews

High



### Supply Chain in the UK Construction Industry is Good, with Strong Supplier Base for Raw Materials



"The construction industry has demonstrated regular consistent growth in the use of composite materials over the past decade and it is projected to continue gradual growth of a few percentage points. Composite materials are expected to continue to substitute other construction materials, particularly aligned with the move towards modular off-site construction." **Part Fabricator, Aerospace Industry** 



"We do export our pultruded construction products to other countries, such as channel, boxes, angles to different European countries, like France, Germany, Netherlands." **Part Fabricator** 



"Lightweight, high volume, higher automation, sustainable, and high value added are some of the key drivers driving the use of composites in the UK construction industry." **Part Fabricator** 



### The UK Needs to Develop Capability in Construction Composites Part Manufacturing

Construction Value Chain	Raw Materials	Part Fabricators	End Users	
	<ul> <li>Major part fabricators are procuring all raw materials fro local players and also through import</li> </ul>	<ul> <li>Major part fabricators, such as Exel Composites, Filon, Epwin, etc., are present in the UK to fulfil domestic demand.</li> </ul>	Building and Construction	

Construction Value Chain	Raw Material	Part Fabricators	End Users	
USA	<ul> <li>Strong presence of major suppliers, such as Toray, Tol Teijin, Hexcel, Huntsman, et</li> </ul>	• All the major part fabricators and players have their c. manufacturing bases in the USA.	Building and Construction	
			Source:	Lucintel

Value Chain Strength

www.lucintel.com

Poor

Moderate

Good



### To Drive Growth in Construction Composites Market, Promote Low Cost Materials, Technologies and Create Awareness amongst Companies about Composites Advantages

Promote Low Cost Materials as the Industry is Highly Price Sensitive

Promote New Technologies, Materials and Applications

Create Awareness Regarding Advantages of Composites amongst Construction Companies

### **Strategic Considerations to Drive Growth in Construction Composites**

- Use low-cost carbon fiber or promote recycled materials. Industry demand growth for high-volume manufacturing and low-cost production could be a major driver.
- Promote more use of thermoplastics, fast processing, high automation rates, identification of end of life options and the start of their development to support markets, and thermoplastic matrices with additional functionality should be encouraged.
- Promote automation processes to reduce operational costs
- Construction is a price-sensitive market and the UK can explore opportunities in bath tubs, gratings, window profiles and ladders market, which are comparatively bigger markets in the USA. Therefore, development of low cost technologies such as spray up, and hand layup processes will allow UK to grab opportunities in above markets
- Lack of awareness amongst the companies regarding benefits and uses of composites is one of the major concerns of fabricators. Increase awareness by promoting benefits of composites to create more demand.

Note: The above strategic perspectives are sum up of views obtained by companies in the primary interviews



### Summary of Deep Dive Analysis of the Five Key Markets

- Aerospace & Defence are the two major industries in the UK composites market, and together accounted for >50% share in the year 2019
  - The UK has good capabilities in intermediate materials & part fabrication. Demands are currently met by domestic production. UK has good potential to increase export revenue by leveraging its existing capabilities
  - Value creation from intermediate material to composite part production in both aerospace & defence industry is ~6X
  - In terms of value chain, the aerospace and defence industries has strong presence in most of the nodes, but the automotive and wind industries are lacking at raw materials and intermediate nodes
- The UK's wind energy industry needs more localized supply chain and government support to build state of the art facility to manufacture larger wind blades and reduce dependency from imports
  - Need for production plant with capacity to produce higher length wind blades
  - Value creation from raw material to wind blade composite part production is ~2.7 times
- The UK's automotive composites industry has good supply chain and composites capability in formula 1 and high-end cars but needs to develop its low cost capabilities for mass volume passenger car production
  - Needs more focus on developing raw materials & intermediate capability, which could attract more tier players & OEMs. Motivate OEMs to incorporate more composites per vehicle
  - Major companies in the UK could also invest into developing capabilities around the good growth of the automotive thermoplastic composites market
  - Value creation from raw material to composite part production is ~3 times



### **Table of Contents**

- Executive Summary
- The UK Composites Supply Chain Analysis
- Opportunities in the UK Composites Industry
- Deep Dive in the Five Key Markets
- Recommendations



### To Drive Growth in Various Verticals, UK Can Develop Capabilities in Low-Cost Manufacturing, and Invest in Technological Advancement



#### **Cost Competitive Part Manufacturing Capabilities**

- High cost of production has been the key concern. UK can invest in developing capabilities in cost competitive part production to address needs in price sensitive markets, such as automotive, marine and construction. Companies could also work to improve production rates and could more effectively utilize its workforce



#### **Develop Strong Local Supply Chain and Increase Exports**

- Encourage export sales leveraging existing intermediates and part fabrication capabilities
- Provide better infrastructure and business environment to encourage global major companies to enter into UK market



#### **Strengthening the Network of Centres of Excellence**

- Composite companies in the UK could work more closely with Centres of Excellence to strengthen their technological capabilities. Centers of Excellence should work to facilitate collaboration with private companies to develop capabilities.



### **Recommendations**

- The UK composites industry employs about 30,000 people (>400 companies), valued at £4 billion (raw materials and parts) in 2019. The market is expected to grow at a CAGR of 2.9% from 2019 to 2035
- The UK had been driving innovation and made advancements in some key markets such as aerospace & defence by developing good machining and part fabrication capabilities. However, in other industries such as automotive, wind, and construction, there is significant competition from other countries, due to high manufacturing cost, and high overhead cost issues in the UK
  - In aerospace and defence, there is a need for investment in new materials and automated processes with the goal to lower the cost of composites whilst improving performance.
  - The UK needs to leverage its existing intermediates and part fabrication capabilities to increase export sales
- The UK automotive composites industry needs to leverage strong engineering capabilities for the high-end segment, and promote usage of new technologies for mass volume production in the UK
- > The UK wind energy industry can build up capacity for plants that can develop large size wind blades and potentially develop export capabilities. It can also reduce dependency on imported raw materials



# **Thank You**