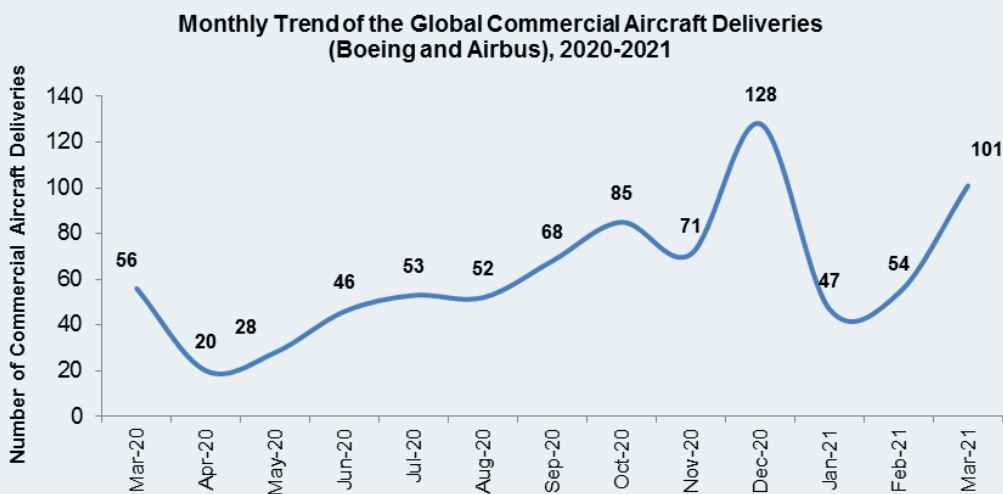


Composites Market Update for March 2021

The US Composites Market in March grew by roughly 15% or more over the prior year, during which we saw the initial impact of COVID in the market, before the major decline in April. Strong March performance was bolstered by winter storms in February delaying certain deliveries into March. The significant jump in demand across all sectors, combined with the decreased raw material supplies from the force majeure challenges in the supply chain, led to a significant increase in raw material prices, as well as supply shortages. Resins spiked, including UPR, epoxies, vinyl esters and others. In addition, the major increases in volume through the market, combined with new COVID requirements, have led to freight and transportation challenges. Importing materials, and securing the freight & trucking are both becoming increasingly problematic and will continue to be a strain on the market as demand is projected to remain high through April. As more and more Americans are vaccinated, there is optimism in the market that growth will continue without a major disruption from COVID. The primary concern for the composites industry right now is managing the supply chain to access enough raw materials and other critical logistics to capitalize on the immediate demand.

Aerospace

Commercial aircraft (Boeing and Airbus) deliveries increased from 54 aircraft deliveries in February, 2021, to 101 aircraft deliveries in March, 2021.



Some highlights of March, 2021, are as follows:

- SE Aeronautics has Deploys Composite One – Piece Fuselage, Thin – Wing Airliner Concept.** The innovative design is a more efficient, light-tri wing configuration that greatly improves lift over drag, resulting in short take-off and landing (STOL) capabilities and long flights. The construction is all composite, molded in one tough, safer piece. The concept’s disruptive design is also expected to double the lifespan of an aircraft, while reducing overall block hour

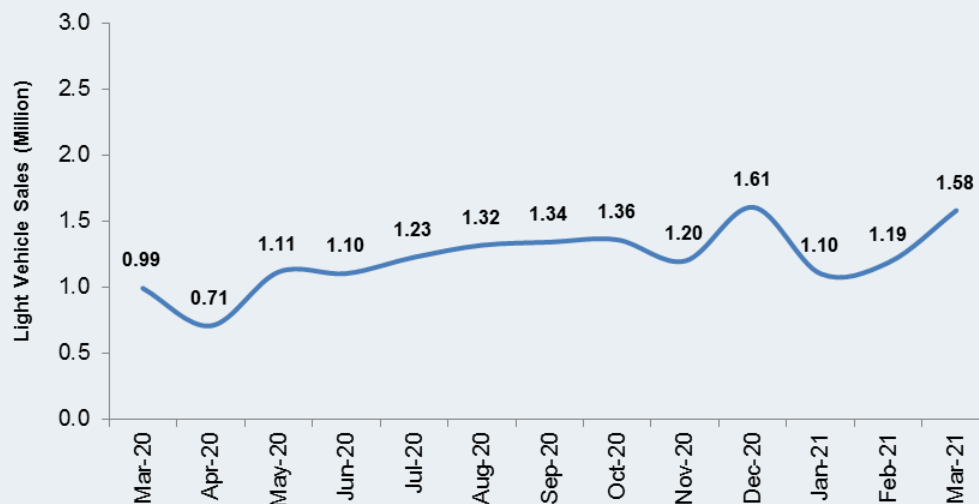
cost by half when compared to other aircraft its size. With an emphasis on safety, the design is made of one solid-molded piece of fuselage that the company claims is many times stronger than existing aircraft.

- Carboman Group Unveil New Direct Mold Tooling for Aerospace Applications.** The tooling solutions provides OEMs and manufacturers with short lead times for highly stable direct molds for series production both in and out of the autoclave at temperatures of up to 180°C. The technology also does not require a traditional plug or mold pattern. The direct mold process begins with the selection of a material combination for the tool surface and support structure to match the coefficient of thermal expansion (CTE) of the mold and the composite part to be processed.
- Kaman Composites Wichita Announces Contract with Boeing.** Kaman Composites to manufacture the refueling boom assembly for the MH-47 program and expand facility to accommodate production scale. The MH-47 is an inflight refuelable version of the CH-47 Chinook helicopter. The boom assemblies will support MH-47 new-build production, as well as MH-47 Block II ReNew modifications.

Automotive

The U.S. new vehicle sales of 1,581,067 units in March, 2021, represented an increase of 59% as compared to 992,392 in March, 2020.

Monthly Trend of Light Vehicle Sales in the US, 2020-2021



Some highlights of March, 2021, are as follows:

- Composites for Structural Batteries.** Researchers in Sweden find carbon fiber composites can be used for creating structural batteries that could help to minimize mass in EVs and consumer electronics. The structural battery composite consists of a carbon fiber negative electrode and an aluminum film-supported positive electrode separated by a glass fiber

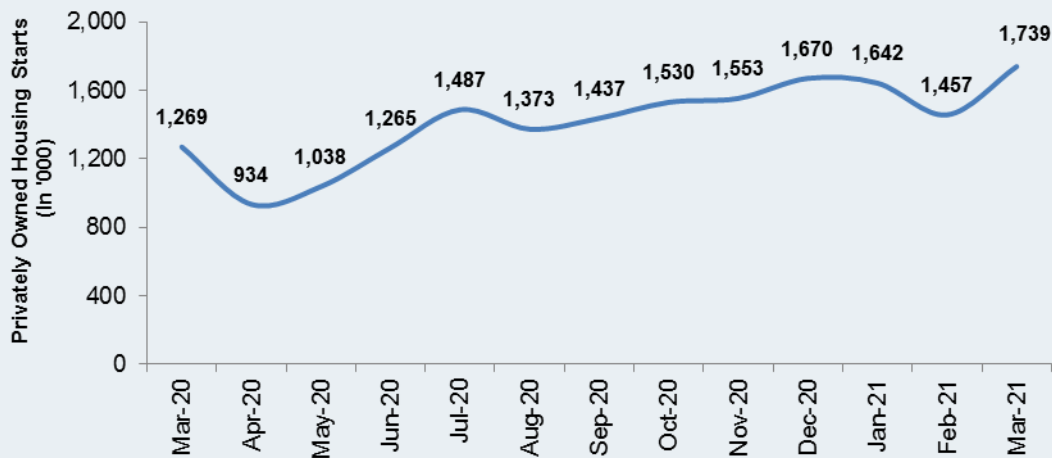
separator in a structural battery electrolyte matrix material. Consequently, the CFs act as host for Li (i.e., active electrode material), conduct electrons and reinforce the material. Similarly, the positive electrode foil provides combined mechanical and electrical functionality. The SBE facilitates Li-ion transport and transfers mechanical loads between fibers, particles and plies. Two types of GF fabric separators, are used as model materials to investigate the effects of separator thickness and architecture, as well as material anisotropy, on the multifunctional performance.

- **Hopium Unveils Hydrogen Vehicle Concept.** The Hopium Māchina offers unparalleled performance for a high-end hydrogen vehicle, including optimized fuel cell system technology and hydrogen tanks. Hydrogen tanks, which incorporate carbon fiber used as a main material element, have been improved to increase storage volume. The tanks enable a quantity of more than six kilograms of hydrogen to be loaded, with a filling time of three minutes. The vehicle's batteries have also been reduced in volume.
- **Mansory Stallone GTS Optimizes Vehicle with Carbon Fiber.** The complete vehicle conversion follows the company's three-generation refinement of the Ferrari Gran Turismo based on the 599 GTB, the F12 and the Ferrari 812 Superfast, a convertible version. In addition to a performance upgrade and interior modifications, its design includes carbon fiber body components.
- **EU LEVIS Project to Develop Lightweight Components for Electric Vehicles.** Consortium to develop three large-scale, real-case demonstrators using multi-material solutions based on thermoplastic carbon fiber compounds integrated with metals. This will be produced through a set of profitable and scalable manufacturing technologies. The new lightweight components will be developed using a circular approach. The priority will be given to recyclable resins and bio-based and recycled carbon fibers to develop the components. In addition, the useful life of these components will be optimized, and they will be designed to allow a simple and efficient disassembly and reuse.

Construction

Privately-owned housing starts in March were at a seasonally adjusted annual rate of 1,739,000. This is 19.4% above the revised February estimate of 1,457,000 and is 37.0% above the March 2020 rate of 1,269,000. Single-family housing starts in March were at a rate of 1,238,000; this is 15.3% above the revised February figure of 1,074,000. The March rate for units in buildings with five units or more was 477,000.

Monthly Trend of Privately Owned Housing Starts in the US, 2020-2021



One of the highlights of March, 2021, is as follows:

- Refitech Expands RefiFLEX Range, Supplies Pultrusion Profiles for Construction Solutions.** Carbon fiber square tube includes a 40 x 40-millimeter high-precision tube with a standard length of 1,600 millimeters, as well as the corresponding connectors. These carbon fiber frames and jigs are both lighter and stiffer than their metal counterparts. Compared to aluminum frames, this system can save up to 70% in weight at a comparable strength and stiffness. End-user advantages are not only high dimensional stability and a very low ergonomic load, but also enable more flexibility for adjustment or the rearrangement of components if required in the production process.

Wind Energy

According to the latest "Energy Infrastructure Update" report from the Federal Energy Regulatory Commission's Office of Energy Projects, the cumulative installed capacity of 9 units during January-February 2021 was 2,263 MW as compared to 813 MW of 7 units during January-February, 2020. With a total installed generating capacity of 124.10 (GW), wind constituted 10.11% of the total installed generating capacity of 1,227.60 (GW) among all energy sources.

Some highlights of March, 2021, are as follows:

- Wind Blade Manufacturing Plant.** GE Renewable Energy's new blade turbine manufacturing plant will transform a former steelworks site on Teesside into a high-tech clean energy powerhouse, creating thousands of highly-skilled jobs in U.K. supply chain. This announcement marks the start of the next generation of offshore wind manufacturing. Teesside will continue to drive forward green industrial revolution as capitalize on new opportunities to produce clean energy through a brand new offshore wind port on the River Tees.

- **Composites Protect Subsea Cables for Offshore Wind Power.** Balmoral uses FRP to improve installation, performance and service life while reducing cable failures in rough seas. Offshore wind turbines provide carbon-free, utility-scale power generation that is increasingly cost-competitive with coal and natural gas. The levelized cost of electricity (LCOE) for offshore wind has dropped 67.5% since 2012 to US \$84 per MW-hour and is expected to reach US\$58 per MW-hour by 2025, thanks to larger turbines and GW-scale projects.

Marine

The US marine industry is expected to recover in 2021 as compared to the declines of 2020.

Some highlights of March, 2021, are as follows:

- **ATL Composite Panel Systems Enable Noosa 7 Dynamic Dayboat Design.** The dayboat is constructed using DuraKore and DuFlex panel systems from ATL Composites and at 2.3 meters wide x 7.3 meter long, weighs only 1,250 kilograms. This is a hand-built, high-end, epoxy composite product. This model made of 100% DuFLEX Composite Panels in CNC-routed kit form. The kit technology minimizes material waste, tooling costs and simplifies quotations.
- **Mini Racing Yacht Integrates Bio-based Sicomin GreenPoxy Resins.** FLOKI 6.5 is built entirely from bio-based/recyclable raw materials without compromising on performance or processability. The use of its GreenPoxy resins in the build of the sustainable mini yacht. The 6.5-meter FLOKI showcases the latest in bio-composite materials and a cost-effective flat panel builds process.
- **Alveus to Commercialize Compa Repairs.** Compa Repairs' solutions for damaged or corroded ship pipes and structures using carbon fiber-reinforced plastic (CFRP) reinforced with epoxy resin, said to be a more cost- and time-effective alternative to traditional methods of repair by welding. Compa Repairs reportedly minimize vessel downtime and increase vessel safety by providing a fast and durable repair while eliminating the use of flame. It is applicable to geometrically complex structures and difficult-to-reach locations. The increase in worldwide demands for repairs has led to the development of the Compa Repairs license solution, which will reportedly make Compa Repairs technology readily available world-wide through a network of trained technical agents while maintaining high quality standards.

Consumer Goods

New orders for manufactured durable goods in February decreased \$2.9 billion or 1.1% to \$254.0 billion, the U.S. Census Bureau announced today. This decrease, down nine consecutive months, followed a 3.5% January increase. Excluding transportation, new orders decreased 0.9%. Excluding defense, new orders decreased 0.7%. Transportation, down following five consecutive monthly increases, led the decrease, \$1.3 billion or 1.6% to \$83.6 billion.

Some highlights of March, 2021, are as follows:

- **Teijin Launches Carbon Fiber Intermediate Material Brands.** Teijin launches its novel Tenax PW (power series) and Tenax BM (beam series) brands of carbon fiber intermediate materials for sports applications. Tenax PW, made of high-tenacity, high tensile modulus resin, is an advanced aircraft-quality material that, as a result of exceptional durability and toughness, maximizes power and speed. Tenax PW also reportedly suppresses and absorbs impact forces to minimize and localize damage after impact and retains a compressive strength superior to that of Teijin's standard carbon fiber prepregs. Tenax BM is another highly advanced material. High rigidity, straightness, operability and stability make it ideal for applications requiring flexibility and resistance to thermal expansion. Tenax BM also offers superior vibration damping (suppression and absorption), achieving damping effects four times greater than that of Teijin's standard carbon fiber prepregs. Sporting goods made with Tenax BM are highly resistant to impact deformation and shakes.
- **Palari Group, Mighty Buildings to Develop Community of 3D-printed, Zero-net Energy Homes.** Palari to construct 15 eco-friendly homes via 3D-printed panelized Mighty Kit system, which delivers prefabricated polymer composite panels for reduced waste and setup time. 3D printing allow to build faster, stronger and more efficiently, making it integral to platform of streamlining home-building process centered on sustainability of construction, materials and operations.
- **Carbon Mobile Carbon Fiber Smartphone Unlocks RF Signal Permeation Capabilities.** Housing is made from Lanxess Tepex thermoplastics reinforced with 1K continuous carbon fiber using Carbon Mobile's patented HyRECM process for a "radio-enabled" composite material. Carbon fibers are effective against electromagnetic shielding, which means that, rather than allowing radio signals to pass through, the material disperses them around the outer body of the device. Connected devices with carbon fiber, for this reason have been viewed as a road block by the tech industry. To further boost the devices' connectivity, a 3D-printed conductive ink is integrated into the carbon fiber structure. Carbon Mobile claims this has resulted in the first "radio-enabled" carbon fiber-based material.
- **Innovative Tooling, Automation Enable New Line of Composite Window Wells.** Mold maker and automation specialist Commercial Tool Group provided RockWell with custom compression molds and robotics to enable high-volume, low-cost production.

Recent Developments in Materials

- **FCI-Marbocote Launches Anti-Corrosion Coating Suitable for Contact with Drinking Water.** FCI-Marbocote, a Brazilian company specialized in the manufacture of mold release agents and anti-corrosion products, has launched its own coating for tanks that store drinking water. Ycon CS Acqua, the product was developed at the request of Vantare, a manufacturer of modular composite tanks. Based on isophthalic resin, FCI's novelty is characterized by high levels of resistance (mechanical and chemical), adhesion and elasticity. "After being applied, Ycon CS Acqua promotes a film of high thickness and totally inert in contact with water.

Noting that the product is ideal for the protection not only of composite substrates, but also of concrete, steel carbon and stainless steel.

- **GKN Aerospace to Develop More Sustainable Composite Material.** GKN Aerospace is leading a new UK industry consortium and focusing to develop more sustainable composite material for the UK aerospace and automotive industries. During a three-year period, the £39.6 million Aerospace and Automotive Supply Chain Enabled Development (ASCEND) consortium, funded by government and industry, will aim to increase the adoption of composite technologies, the industrialization of new technologies, and aerospace production rates to meet future high-volume requirements. Plans are to design more lightweight structures to make the air mobility, aerospace and automotive industries more sustainable.
- **Arlon EMD Introduces 84HP Prepreg to Compliment the 85HP Laminate System.** Arlon Electronic Materials introduces 84HP high-performance 250°C Tg temperature polyimide resin prepreg. Arlon developed 84HP as a prepreg bonding companion to Arlon's 85HP filled pure polyimide resin laminate system. 84HP is designed for use in filling etched areas in polyimide multilayers that contain thick copper metal cores. Proprietary filler is dispersed within the 84HP and 85HP polyimide resin which serves to reduce shrinkage and inhibit crack formation during lamination and through-hole mechanical drilling processes. This unique formulation has proven benefits such as improved drilling over conventional polyimide resin systems, predictable dimensional stability, and reduction in gouging and glass wicking during hole formation.
- **Halogen-Free FR Polyamides Yield Parts With Superior Surface Finish and Excellent Property Retention upon Aging.** Three halogen-free FR glass-reinforced polyamide compounds with UL94 ratings of V0 provide high flow for injection molding, superior surface finish, and improved property retention in comparison with standard glass-filled FR polyamide 66. Creamid grades A3H7G3, C3H2G4, and C3H2G6 from Teknor Apex Company are polyamide 66-based compounds with glass loadings of 15%, 20%, and 30%, respectively. Their non-halogen flame retardant formulations make possible compliance with European RoHS and WEEE directives as well as internal OEM requirements. Teknor Apex recommends the compounds for applications such as appliance and power tool housings, electronic handheld devices, components for charging infrastructure for electric vehicles, and certain under-hood automotive components requiring FR properties.
- **Partnership between Hypetex and Composite Envisions.** This partnership will give the US market access to the Hypetex portfolio of technical colored carbon fiber materials for the very first time. Hypetex colored carbon fiber has the mechanical properties required from this technical material whilst offering of a choice of color previously missing from this advanced materials toolkit, making it an easy choice for anyone looking to make great parts that are not 'grey'. The result is a colored natural carbon fiber 3D aesthetic, straight from the mold; reducing post processing costs and inefficiencies whilst offering a more environmentally friendly coloring solution.

Recent Product Launches in the Composites Market

The following table represents new product launches in the composites market in March, 2021.

Product	Company Name	Description
Carbon fiber satellite optical instrument	Eire Composites	Development and manufacture of three composite stray light baffles for the ESA's ALTIUS satellite will assist in climate change research. According to ÉireComposites, the baffles will be the first external part and largest functioning piece of equipment manufactured in Ireland and launched into space.

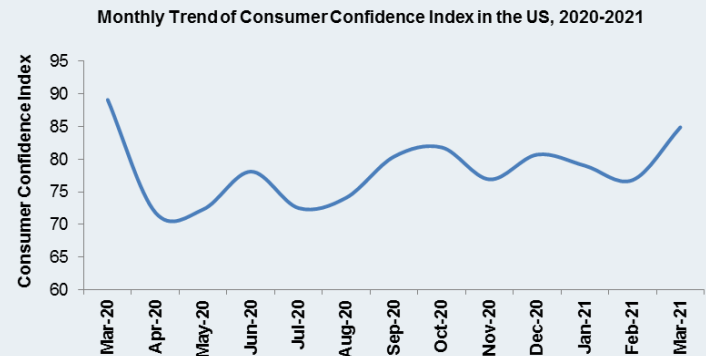
The US Economic Overview – March, 2021

The US Consumer Confidence Index increased to 84.9 in March, 2021, as compared to 76.8 in February 2021. The GDP at current price of the US decreased from US \$21.9 trillion in January, 2021, to US \$21.8 trillion in February 2021.

Real gross domestic product (GDP) increased at an annual rate of 4.3% in the fourth quarter of 2020, according to the "third" estimate. The increase in real GDP reflected increases in exports, nonresidential fixed investment, personal consumption expenditures (PCE), residential fixed investment, and private inventory investment that were partly offset by decreases in state and local government spending and federal government spending.

The increase in fourth quarter GDP reflected both the continued economic recovery from the sharp declines earlier in the year and the ongoing impact of the COVID-19 pandemic, including new restrictions and closures that took effect in some areas of the United States. The full economic effects of the COVID-19 pandemic cannot be quantified in the GDP estimate for the fourth quarter of 2020 because the impacts are generally embedded in source data and cannot be separately identified.

The price index for gross domestic purchases increased 1.7% in the fourth quarter, compared with an increase of 3.3% in the third quarter. The PCE price index increased 1.6%, compared with an increase of 3.7%. Excluding food and energy prices, the PCE price index increased 1.3%, compared with an increase of 3.4%.



About Lucintel: Lucintel has been in the business for 15 years and has served thousands of clients, ranging from small, emerging organizations to multinational Fortune 500 companies such as 3M, Ashland, Audi, Dow, GE, General Motors, and Momentive. Lucintel is a growth accelerator firm that helps companies with market entry strategies, growth financing, M&A, market research, and strategic consulting. Let us create a growth roadmap that meets your goals and budget. Contact us today (email: helpdesk@lucintel.com or call us at 972-636-5056) for a free consultation and we will explain how Lucintel can assist your business.