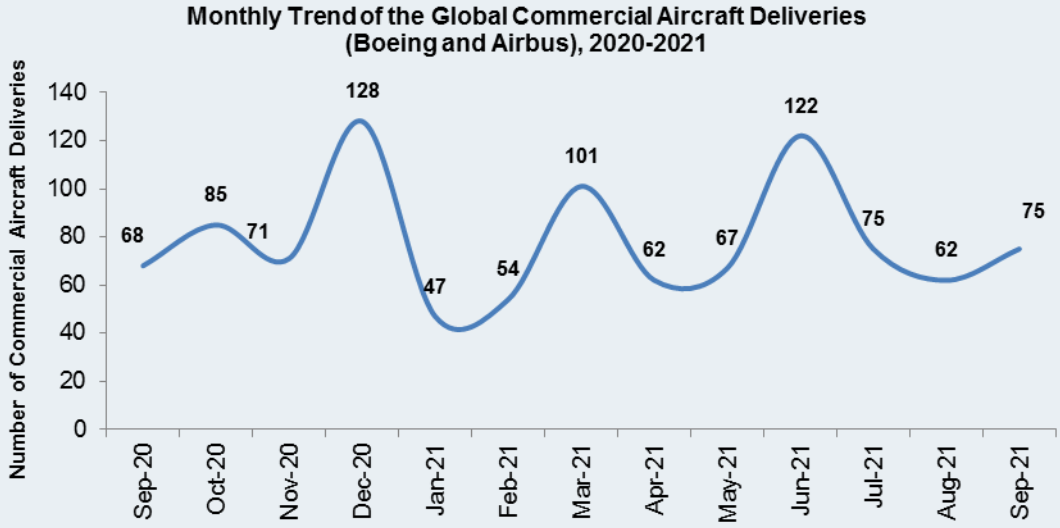
US Composites Market Monthly Insights
September 2021

Composites Market Update for September 2021

Demand in the US Composites Market in September 2021 remained strong at equal to or just slightly behind September 2020, when the market was recovering after the peak of the pandemic. All sectors remained robust, including construction, marine, and automotive. The outlook for October is projected to be similar to 2020, which was a strong month due to the pent-up demand in the market. Today, the supply chain is unable to meet the full demand in the market, which has been driving raw material costs steadily upward over the past several months, and that trend is expected to continue. Glass fiber, vinyl ester, maleic, and epoxy supplies are not able to keep up with the current demand. The rest of the supply infrastructure is in a tenuous balance (no slack in the supply chain) as suppliers struggle to get materials to market despite freight, import, labor, and related logistics challenges. These challenges are expected to persist. This puts the market at risk of being disrupted regionally by natural disasters, like Hurricane Ida, or at the macro level by international trade disputes. Maintaining a robust supply chain is the major focus of players throughout the value chain, which includes finding truck drivers, containers, and similar resources to keep up with demand.

Aerospace

Commercial aircraft (Boeing and Airbus) deliveries increased from 62 aircraft deliveries in August 2021 to 75 aircraft deliveries in September 2021.



Some highlights of September 2021 are as follows:

- **NASA Begins Air Taxi Flight Testing with Joby.** NASA began flight testing Monday with Joby Aviation's all-electric vertical takeoff and landing (eVTOL) aircraft as part of the agency's Advanced Air Mobility (AAM) National Campaign. This is the first time NASA will test an eVTOL

aircraft as part of the campaign. In the future, eVTOL aircraft could serve as air taxis for those in cities and surrounding areas around the country, adding another mode of transportation for moving people and goods. NASA's goal is to collect vehicle performance and acoustic data for use in modeling and simulation of future airspace concepts. This test will help identify gaps in current Federal Aviation Administration regulations and policies to help incorporate AAM aircraft into the National Airspace System.

- **Airbus Single-Aisle Airspace Cabin enters into Service with Lufthansa Group.** Lufthansa becomes the first airline in Europe to feature Airbus' new Airspace cabin, which makes extensive use of composites, on single-aisle aircraft. The new Airspace features include slimmer sidewall panels for extra personal space at shoulder level; better views through the windows with redesigned bezels and completely integrated window shades; large, composite overhead bins for 60% more bags; the latest full LED lighting technologies; LED-lit "entrance area"; and new lavatories with hygienic touchless features and antimicrobial surfaces.
- **Vertical Aerospace partners with GKN Aerospace on Wing Structure for VA-X4 Evtol.** GKN will deliver wing structures and wiring systems for the composites-intensive, zero-emissions aircraft. Vertical plans to benefit from GKN Aerospace's experience in aero structures design and manufacture for leading commercial and defense aircraft. GKN Aerospace's wing structures and wiring are expected to lead to a VA-X4 aircraft with higher performance; lower manufacturing costs, weight and emissions; a secure path to certification; global production; and shorter production times and lower unit costs.
- **Hexcel Awarded Long-Term Contract for Additive Manufactured Parts for the Boeing 777X Family.** Hexcel Corporation has been awarded a multi-year contract to produce aerospace structures made with HexPEKK-100 for the Boeing 777X. The parts will be manufactured at the company's additive manufacturing site near Hartford, Connecticut. HexPEKK components can be manufactured-to-print for commercial aerospace, defense and space applications where complexity, lightweight, and strong mechanical performance are critical. These 3D-printed parts meet interior aircraft smoke and toxicity requirements.

Automotive

The U.S. new vehicle sales of 1,006,875 units in September 2021 represented a decrease of 25% as compared to 1,341,099 in September 2020.

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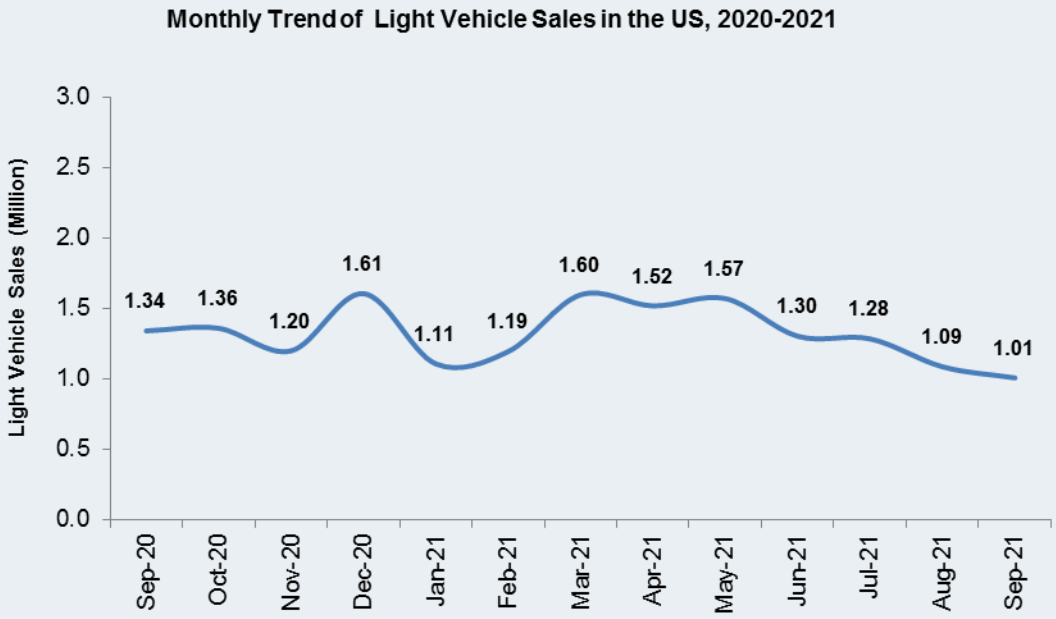


Some highlights of September 2021 are as follows:

- **Five Strong Organizations Come together to form Teijin Automotive Technologies.** Five strong organizations – Continental Structural Plastics (CSP), Inapal Plasticos, Benet Automotive, CSP Victall and Teijin Automotive Center Europe (TACE) – have come together under a single brand to form Teijin Automotive Technologies, a global leader in composite materials and solutions for the worldwide mobility industry. The new organization which includes Teijin's automotive composites team in Japan is positioned to provide advanced materials solutions through its 29 strategically located manufacturing and technical centers. Utilizing all the strengths from the previously separate companies, Teijin Automotive Technologies can provide unique solutions for the next generation of mobility.
- **Creative Composites Supply Innovative SMC Parts for New Revolutionary Electric Light Commercial Van.** The UK's most advanced composites manufacturer – Creative Composites based in Lisburn, Northern Ireland - is delighted to be supplying innovative SMC parts for a new revolutionary electric light commercial van. The unique range of SMC compression molded parts have been chosen for longevity and light weighting to improve fuel efficiency, lower vehicle operating costs and extend the vehicle's zero power range. The composites manufacturer has been working in collaboration with one of the UK's leading OEM's for several years. Together they have developed SMC parts for use in a range of iconic and ground-breaking vehicles, manufactured at the UK's only dedicated electric vehicle factory. The parts include SMC front fenders and doors, designed to offer longevity, flexibility and robustness against everyday dents and knocks.
- **ARRIS, U.S. Army & LIFT Launch Collaborative Project to Lightweight Vehicles.** Army vehicles have been increasing in weight over time due to new technology and safety components for soldiers, and this partnership is part of the Army's effort to advance the use of cutting-edge technologies that enable high-strength, lighter, more fuel-efficient tactical vehicles with superior mobility and protection. By replacing an assembly of metal components in crew seats

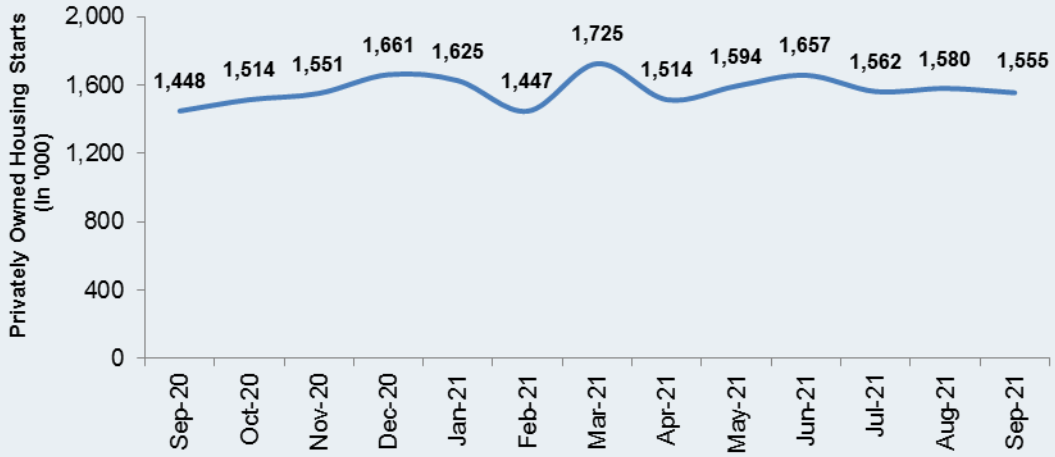
with a single continuous fiber-reinforced composite (CFRC) structure, ARRIS will demonstrate the advantages of its manufacturing technology for broader vehicle applications.

- **Hexcel and HP Composites Collaborate to Develop Class A Body Panels.** Hexcel has collaborated with HP Composites S.p.A (HP Composites), a world leader in the production of carbon fiber components for automotive and motorsports, to develop carbon fiber Class A body panels. Hexcel HexPly XF surfacing technology is being extensively used by the Italian component producer to manufacture external body panels and other components for supercars such as Alfa Romeo's stunning new supersport sedans, the Giulia GTA, and GTAm. HP has combined this processing expertise with Hexcel HexPly XF3 surfacing material, HexPly M47, and HexPly M49 prepregs, working to the highest standards set by the most prestigious supercar OEMs and leading motorsport teams.

Construction

Privately-owned housing starts in September 2021 were at a seasonally adjusted annual rate of 1,555,000. This is 1.6% below the revised August 2021 estimate of 1,580,000, but is 7.4% above the September 2020 rate of 1,448,000. Single-family housing starts in September were at a rate of 1,080,000; this is virtually unchanged from the revised August figure of 1,080,000. The September rate for units in buildings with five units or more was 467,000.

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



One of the highlights of September 2021 is as follows:

- **Hexion Introduces "VeoVa House" Virtual Showroom to Highlight Versatility of VeoVa Monomers.** Manufacturers of polymeric binders, coatings, adhesives and concrete additives looking to improve the performance and sustainability of their products have a new, easy-to-navigate online platform to browse and request information and support. Designed like a contemporary home, Hexion's virtual VeoVa House (veovahouse.hexion.com), which launches today, features call-outs to VeoVa vinyl ester applications, advantages, data sheets and other customer resources. VeoVa monomers are the vinyl esters of Versatic acids and have unique, highly branched aliphatic structures, which contribute to the performance of coatings and

adhesives derived from them. VeoVa monomers can be used in a variety of emulsions to improve resistance to water, alkali, UV light, and scrubbing, resulting in coatings, adhesives and other construction materials that are more durable, easier to work with, lower in odor and with a better appearance.

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 41 units during January-August 2021 was 7,224 MW as compared to 5,253 MW of 54 units during January-August 2020. With a total installed generating capacity of 129.53 (GW), wind constituted 10.48% of the total installed generating capacity of 1,236.14 (GW) among all energy sources.

One of the highlights of September 2021 is as follows:

- **GE, Fraunhofer IGCV, Voxeljet to Develop the World's Largest 3D Printer for Offshore Wind Applications.** The 3D-printed molds will bring many benefits, including improved casting quality through improved surface finish, part accuracy and consistency. Furthermore, sand binder jet molds or additive molds provide cost savings by reducing machining time and other material costs due to optimized design. The modular 3D printing process, which is based on Voxeljet's binder-jetting technology, can be configured to print molds for castings up to 9.5 meters in diameter and 60-plus tons in weight. In addition, the use of the 3D printer is expected to reduce the product's carbon footprint by eliminating the need to transport the large parts from a central manufacturing location.

Marine

The US marine industry is anticipated to experience good growth in 2021.

Some highlights of September 2021 are as follows:

- **Caracol and NextChem Collaborates to Debut One-Piece, 3D-Printed Composite Sailboat.** According to Caracol, fiberglass and other traditional materials used to build sailboats can be difficult to recycle, and require the production of molds for infusion. For Beluga, Caracol employed its proprietary, robotic additive manufacturing system to produce the boat's hull in a single piece, no mold required, using recycled MyReplast PP reinforced with glass fiber for stabilization during printing and increased part rigidity and performance.
- **Massivit 3D Marks its Presence at IBEX 2021 - Florida, with Large-Scale, High-Speed 3D Printing for Marine Manufacturing.** The latest of Massivit 3D's portfolio of 3D printers, the Massivit 5000 offers a colossal build volume of 57" x 44" x 70" (145cm x 111cm x 180cm) and facilitates high-speed production of parts that instantly cure during the printing process, offering ready-made parts straight off the printer - with practically no required support structures. Large, lightweight parts can be printed without the need for excessive post processing. It also facilitates sea-worthy end-use parts with significantly shorter lead times, lower costs, and less waste than those of traditional manufacturing processes. The machine enables complex Geometries that can serve as a core for composite marine parts made of

fiberglass, carbon fiber, and Kevlar and its output has been proven to withstand required minimum loads for a range of maritime parts.

Consumer Goods

New orders for manufactured durable goods in September decreased $1.0 billion or 0.4% to $261.3 billion, according to the U.S. Census Bureau. This decrease, down following four consecutive monthly increases, followed a 1.3% August increase. Excluding transportation, new orders increased 0.4%. Excluding defense, new orders decreased 2.0%. Transportation equipment, down two of the last three months, drove the decrease, $1.8 billion or 2.3% to $77.7 billion.

One of the highlights of September 2021 is as follows:

- **Salewa's New Hiking Boot Features Thermoplastic Composites.** Salewa's new ultralight, crampon-compatible mountain boot, the Ortles Couloir, weighs only 725 grams. The boot is named after the Ortles Mountain, the highest peak of the Rhaetian Alps. Salewa's Ortles Couloir will be available in stores beginning in fall 2021. The boot includes thermoplastic composites from Xenia Materials (Mussolente, Italy). According to Salewa, the toecap is produced on a polymeric base reinforced with carbon fiber. This carbon solution was designed to offer and guarantee both stiffness and flexibility.

Recent Developments in Materials

- **Notus Composites Expanding High-Performance Epoxy Range.** UAE-based Notus Composites is expanding its high-performance epoxy range with the new NE7 low temperature curing prepreg system. Its new formulation allows composite manufacturers to cure components at temperatures as low as 70˚C, reducing energy consumption and enabling more cost-effective tooling options. Notus Composites has developed the new NE7 prepreg system for applications across the marine, architecture, industrial and wind energy sectors, with the novel low temperature curing chemistry delivering significant cost benefits.
- **Xlynx Materials Releases New Polymer Molecular Glue: Bondlynx.** XlynX Materials has reported the creation of a new class of adhesives they are calling molecular glues. These make it possible to permanently adhere difficult-to-bond polymers such as polyethylene and polypropylene to themselves, and to other materials, through exceptionally strong chemical bonds. Conventional adhesives typically take advantage of mechanical forces to hold materials together.
- **Lanxess Expands Its Range of Flame-Retardant Plastics.** LANXESS is expanding its range of flame-retardant compounds to include material variants that offer a high degree of flame resistance in glow wire tests performed according to this standard. The latest addition to this range is the halogen-free, flame-retardant Durethan BKV30FN34, which is aimed primarily at users who – for safety reasons – prefer glow wire testing on the end product in accordance with the strict conditions and requirements of the standard for domestic appliances. This polyamide 6 compound offers tremendous safety reserves thanks to its high degree of flame resistance. Another advantage of this material is its high tracking resistance of 600 V (CTI A, Comparative Tracking Index, IEC 60112), which reduces the risk of short circuits and defects

caused by creepage currents. This allows designers to make electrical and electronic modules more compact, in turn reducing the size of the final product.

- **Airtech's Dahltram Resins Approved for Use on All Thermwood LSAM 3D Printers.** As Airtech continues to drive innovation, development, and testing in the additive manufacturing market, it has partnered with Thermwood Corporation to ensure its Dahltram resins meet and exceed the requirements for 3D printing on the LSAM platform. As a leading manufacturer of industrial large scale 3D printers and 5 axis routers, Thermwood's LSAM technology delivers high-performance tooling, masters, patterns, molds and fixtures at high throughput to near net shape, with precision and vacuum integrity. As this partnership continues to produce technological advances, Airtech will actively maintain its collaboration with Thermwood in the development of new materials and expanded functionality.

Recent Product Launches in the Composites Market

The following table represents new product launch in the composites market in September 2021.

Product	Company Name	Description
Carbon Fiber Smartphone	Carbon Mobile	The Berlin-based start-up Carbon Mobile declares the relocation of its production of sustainable smartphones to Germany. In partnership with commerce & lifecycle service provider, Ingram Micro, the company's future devices will be produced in the former Motorola factory in Flensburg. The location takes into account the vision to increase high-end quality and sustainability in smartphone production whilst reinstating Schleswig-Holstein in Northern Germany, an influential region in technology.
RecyclableBlade	Siemens Gamesa	According to the company, the blades are manufactured from multiple reinforcement materials — in the same IntegralBlade manufacturing process as Siemens Gamesa's other blades — combined with a new resin that has been designed to dissolve in a reportedly mild, efficient recycling process at the end of the blade's service life. The company says this process and resin protects the properties of the blade reinforcement materials, and allows them to be reused or recycled into new applications after separation from the resin.

The US Economic Overview – September 2021

The US Consumer Confidence Index increased to 71 in September 2021 as compared to 70.3 in August 2021. The GDP at current price of the US increased from US $22.91 trillion in July 2021 to US $23.23 trillion in August 2021.

Real gross domestic product (GDP) increased at an annual rate of 2.0% in the third quarter of 2021, according to the "advance" estimate. The increase in real GDP in the third quarter reflected increases

in private inventory investment, personal consumption expenditures (PCE), state and local government spending, and nonresidential fixed investment that were partly offset by decreases in residential fixed investment, federal government spending, and exports.

The increase in third quarter GDP reflected the continued economic impact of the COVID-19 pandemic. A resurgence of COVID-19 cases resulted in new restrictions and delays in the reopening of establishments in some parts of the country. Government assistance payments in the form of forgivable loans to businesses, grants to state and local governments, and social benefits to households-- all decreased. The full economic effects of the COVID-19 pandemic cannot be quantified in the GDP estimate for the third quarter because the impacts are generally embedded in source data and cannot be separately identified.

The price index for gross domestic purchases increased 5.4% in the third quarter, compared with an increase of 5.8% in the second quarter. The PCE price index increased 5.3% as compared with an increase of 6.5%. Excluding food and energy prices, the PCE price index increased 4.5% as compared with an increase of 6.1%.