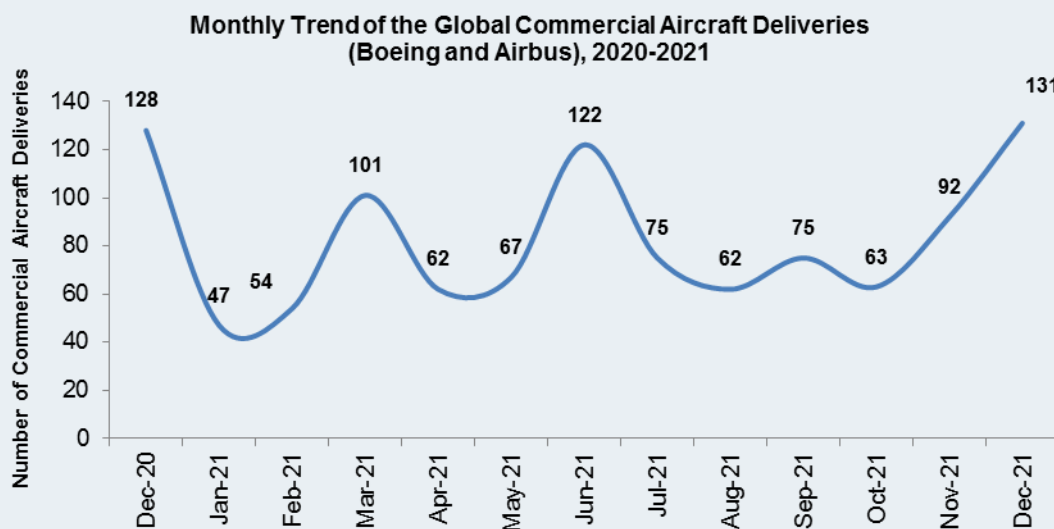


Composites Market Update for December 2021

The year 2021 ended with a strong December, performing at roughly 5% above the previous year, which had a particularly strong December. Because of the holidays, December is usually not a good representation of market trends. However, housing and building products, marine, automotive, and infrastructure industries saw strong performance. RV was down slightly, but all sectors are projected to remain robust in the near term, with January projected to perform at or above previous year performance. Raw material access and pricing have been showing signs of stabilization, although costs continue to creep upward due to challenges with freight & transportation, labor challenges, and related logistics issues. Raw material prices are expected to continue to grow at a slow rate. The market is still vulnerable to disruptions because it is working to maximize efficiency to meet demand, and is therefore in a constant state of adjustment to overcome myriad challenges stemming from labor and shipping issues. In order to maximize performance, schedules are tight, shipments are full, and minor disruptions become more difficult to resolve because there is less slack in the value chain to adjust without causing additional headaches. Still, demand remains high, and that is a good sign for the overall industry.

Aerospace

Commercial aircraft (Boeing and Airbus) deliveries increased from 92 aircraft deliveries in November 2021 to 131 aircraft deliveries in December 2021.



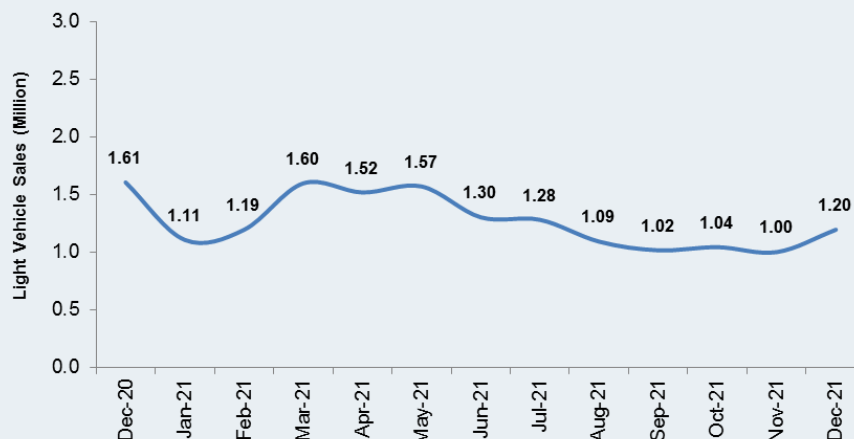
Some highlights of December 2021 are as follows:

- Archer Aviation's Maker eVTOL completed its First Successful Flight.** Archer Aviation's composites intensive electric vertical takeoff and landing (eVTOL), named as Maker eVTOL demonstrator aircraft, completed its first successful hover flight. The flight marks the company's first full and complete systems test and validation of every hardware and software component to successfully move the aircraft into the air. Over the past two months, the company has been focused on Maker's integration and ground testing in order to prepare the aircraft for a successful first hover flight, as well as ensuring it meets the FAA's standards for airworthiness certification.
- First Fully U.S. made Fairing Launched into Space features OOA Composites.** United Launch Alliance composites-intensive Atlas V rocket launched the Space Test Program (STP)-3 mission for the U.S. Space Force Space Systems Command (SSC) from Cape Canaveral, Fla., U.S. This flight is a key milestone for us," says Dan Merenda, managing director, RUAG Space USA. "For the very first time, a fully U.S.-made fairing from us will fly into space." It is also the first time a payload fairing made via the out-of-autoclave (OOA) process will fly aboard an Atlas V rocket.
- Toray Advanced Composites to Lead Research Consortium for Developing Liquid Hydrogen Composite Tanks.** Toray Advanced Composites, together with partners from industry and academia, has been awarded funding from the Dutch Ministry of Economic Affairs and Climate Policy's Research and Development for Mobility scheme for the development of a long-life, fully composite liquid hydrogen tank for civil aviation. The cross-sector research undertaken as part of this program aims to result in a lightweight composite tank that can withstand the incredibly low temperature of liquid hydrogen, minus 253°C. The project will focus on composite tank construction, digital design strategies and production technologies.

Automotive

The U.S. new vehicle sales of 1,195,298 units in December 2021 represented a decrease of 26% as compared to 1,605,497 in December 2020.

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



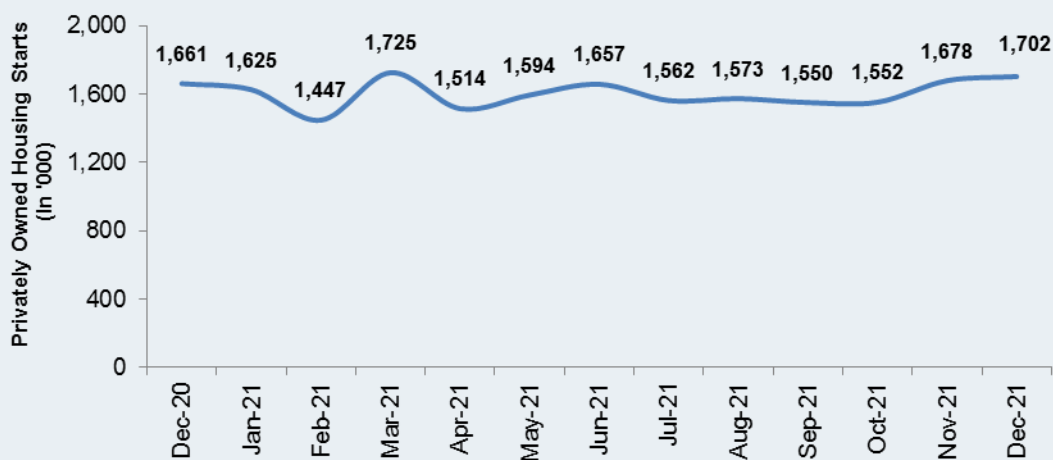
Some highlights of December 2021 are as follows:

- **Plastic Omnium New Energies Division Ramps-up Focus on Hydrogen Mobility.** Hydrogen portfolio, new company hires and expansion in capabilities including increased production capacity, R&D and new production line implementation continue to expand under this division. The company's announced first hydrogen vessel production line for USA, operational in 2023.
- **Autonomous Electric Shuttle Retrofitted with CRP Technology's Windform Materials.** Ground mobility company Local Motor's autonomous electric vehicle Olli 2.0 is fitted with 3D-printed parts manufactured by CRP Technology.
- **Hexagon Purus to Assemble, Deliver Complete Vehicle Integration for Hydrogen-Powered Trucks to USA.** Hexagon Purus will assemble and deliver the complete trucks which involve integration of an electric drivetrain, a fuel cell module as well as the company's ProCab Hydrogen Storage system and Hexagon Purus ProPack high energy density Li-ion battery packs. The trucks will be delivered starting Q2 2022.

Construction

Privately-owned housing starts in December were at a seasonally adjusted annual rate of 1,702,000. This is 1.4% above the revised November estimate of 1,678,000 and is 2.5% above the December 2020 rate of 1,661,000. Single-family housing starts in December were at a rate of 1,172,000; this is 2.3% below the revised November figure of 1,199,000. The December rate for units in buildings with five units or more was 524,000.

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



One of the highlights of December 2021 is as follows:

- **IsoTruss Receives EPA Funding for R&D in Fiber-reinforced Concrete Foundations.** Eco-friendly concept increases resiliency and energy absorption, decreases installation time and costs for use in telecommunication tower infrastructure. The proposed IsoTruss-reinforced concrete foundation aims to improve the resiliency over steel-reinforced concrete by better combining the axial and shear strength of the reinforcement, providing more energy absorption and allowing IsoTruss-reinforced concrete to be rated to withstand higher loading conditions.

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 53 units during January - November 2021 was 9,683 MW as compared to 8,606 MW of 72 units during January - November 2020. With a total installed generating capacity of 131.97 (GW), wind constituted 10.61% of the total installed generating capacity of 1,243.34 (GW) among all energy sources.

Some highlights of December 2021 are as follows:

- **Vestas Looks to Scale-up Blade Recycling Partnership Solution Offering to U.S. and Other Regions.** Vestas seeks areas where local recycling infrastructure is robust, and customer demand can be established. Recycling methods can include cement co-processing, gasification, development of new composite materials and reclamation. The recyclable glass fiber material is separated from the turbine, cut into transportable units and is transported to vetted recycling partners, using a glass fiber recycling method that aligns with the customer's sustainability ambitions.
- **Orbital Composites Installs Robotic Manufacturing System at NREL for Wind Turbine Blade Research.** According to Orbital, the track was customized to meet the requirements of the chosen KUKA robot and NREL's safety and precision standards. The collaboration promises to further Orbital and NREL's shared goal of developing a sustainable energy future.
- **Hexcel Partners with METYX for High Performance Carbon Pultrusion Technology.** Two companies announced collaboration to manufacture high-performance carbon pultruded profiles made from polyurethane (PU) resin and unidirectional carbon fiber for the wind energy market. The two companies have joined forces to develop technology that builds on Hexcel expertise in polyurethanes for the ski industry combined with its strength in providing high-performance composites to wind energy customers and expanding to other markets for composite applications.

Marine

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

Highlights of December 2021 are as follows:

- **Hexcel Prepregs Power Cleaner Ocean Transport with Chantiers de l'Atlantique Silenseas Project.** Hexcel, a global leader in advanced composite technologies, announces the successful completion of a 34m HexPly® carbon fiber prepreg mast for the Chantiers de l'Atlantique Silenseas project. The Silenseas project was started by Chantiers de l'Atlantique, said to be one of the world's largest shipyards, to validate its new concept to power the next generation of quieter and more environmentally responsible cruise ships. Silenseas vessels harness the power of ocean winds with large carbon fiber masts flying composite solid sails. In combination with dual-fuel engines for ships, the composite sail plan will deliver fuel savings of up to 30%, with the goal of reducing future greenhouse gas (GHG) emissions.

Consumer Goods

New orders for manufactured durable goods in December decreased \$2.4 billion or 0.9% to \$267.6 billion, according to the U.S. Census Bureau. This decrease, down following two consecutive monthly increases, followed a 3.2% November increase. Excluding transportation, new orders increased 0.4%. Excluding defense, new orders increased 0.1%. Transportation equipment, down three of the last four months, drove the decrease, \$3.3 billion or 3.9% to \$80.1 billion.

Some highlights of December 2021 are as follows:

- **Wabash Developing Walk-in Cargo Van to Add to Growing Portfolio of Home Delivery Solutions.** Wabash the innovation leader of engineered solutions for the transportation, logistics and distribution industries plans to launch a walk-in cargo van by 2023, adding to its expanding portfolio of home delivery solutions. With the introduction of a walk-in van body, Wabash adds a product line critical in supporting key customer efforts to efficiently scale home delivery driven by ecommerce. A new walk-in van body will add to the company's existing solutions in dry and refrigerated freight, parcel delivery and curtain side.
- **Ruckus Composites Launches Composite Bicycle Science Program, Identifies Upcoming Research.** Ruckus Composites focuses continuously on setting the standard for the inspection and repair of carbon fiber bicycles; so far, more than 16,000 bicycles have been studied. Recently, the company launched a cutting-edge carbon bicycle science program that uses chemistry, physics, and engineering to investigate important questions in fields including sustainability, design, maintenance and repair.

Recent Developments in Materials

- ExxonMobil Chemical Acquired California-based Materia Inc.** Exxonmobil acquired Materia, a technology company pioneered the development of a Nobel prize-winning technology for manufacturing a new class of hycarbon based materials with performance and sustainability advantages. The innovative materials can be used in a number of applications, including wind turbine blades, electric vehicle (EV) parts, sustainable construction and anticorrosive coatings.
- MCC and MCAM Develop FRTP with Flame Retardancy.** Mitsubishi Chemical Corporation (MCC) and Mitsubishi Chemical Advanced Materials Japan Ltd. (MCAM) have developed a thermoplastic composite material (FRTP) which offers flame retardancy, high production performance, and recyclability. MCC and MCAM have developed FRTP by bringing together MCC's technology about battery systems and optimizing its unique fibers and thermoplastic resin compositions and achieving fire resistance that withstands more than 5 minutes of a flame over 1000 experiment. MCC and MCAM have already commenced sample work for some customers, and aim to develop new applications, such as battery enclosures.
- SABIC Introduces New LNP ELCRIN iQ Compounds Using Pre-Consumer Recycled Glass Fiber.** SABIC launched new LNP ELCRIN WF006XXPiQ compound and LNP ELCRIN WF0061XPiQ compound, the first two grades in a new portfolio of materials that incorporate pre-consumer recycled glass fiber diverted from the waste stream of industrial processes. These polybutylene terephthalate (PBT) compounds, each reinforced with 30% pre-consumer recycled short glass fiber, offer mechanical properties and color equivalency of ELCRIN iQ grades that use virgin glass fiber reinforcement. This new technology further decreases the carbon footprint of ELCRIN iQ materials, which already support the circular economy and help reduce plastic waste by using upcycled polyethylene terephthalate (PET) from discarded water bottles.

Recent Product Launches in the Composites Market

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

Product	Company Name	Description
Carbon One	Litespeed Racing	The revolutionary Carbon One wheel weighs in at a feather light 14.2 pounds for 20X9.5 inch, making it the lightest 20 inch wheel in the world. The secret to its ultra-lightweight is in its manufacturing process. The Carbon One wheel is made from prepreg, "dry" carbon fiber and is cured under extreme heat and pressure inside of an Autoclave. The prepreg "dry" process is different from standard carbon fiber which is made by applying a wet resin to the raw carbon fiber sheet. This dry process is much more precise and is very strong, which allows for lighter and stronger carbon fiber parts that can also withstand higher temperatures.

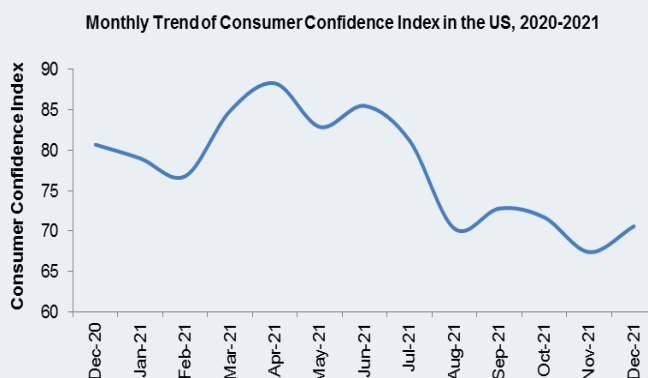
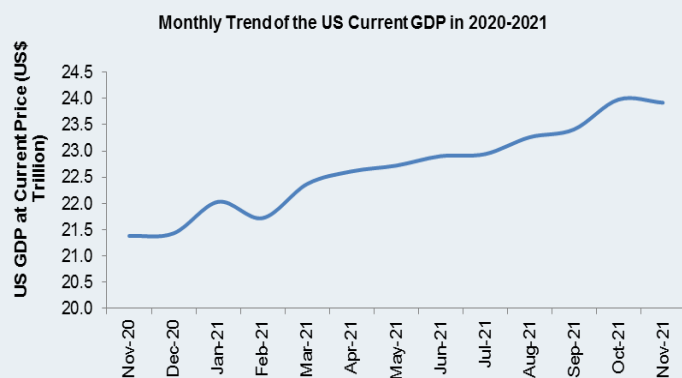
The US Economic Overview – December 2021

The US Consumer Confidence Index increased to 70.6 in December 2021 as compared to 67.4 in November 2021. The GDP at current price of the US decreased from US \$23.98 trillion in October 2021 to US \$23.92 trillion in November 2021.

Real gross domestic product (GDP) increased at an annual rate of 6.9% in the fourth quarter of 2021, according to the "advance" estimate. The increase in real GDP primarily reflected increases in private inventory investment, exports, personal consumption expenditures (PCE), and non-residential fixed investment that were partly offset by decreases in both federal and state and local government spending.

The increase in fourth quarter GDP reflected the continued economic impact of the COVID-19 pandemic. In the fourth quarter, COVID-19 cases resulted in continued restrictions and disruptions in the operations 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 as provisions of several federal programs expired or tapered off.

The price index for gross domestic purchases increased 6.9% in the fourth quarter as compared to an increase of 5.6% in the third quarter. The PCE price index increased 6.5% as compared to an increase of 5.3%. Excluding food and energy prices, the PCE price index increased 4.9% as compared to an increase of 4.6%.



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