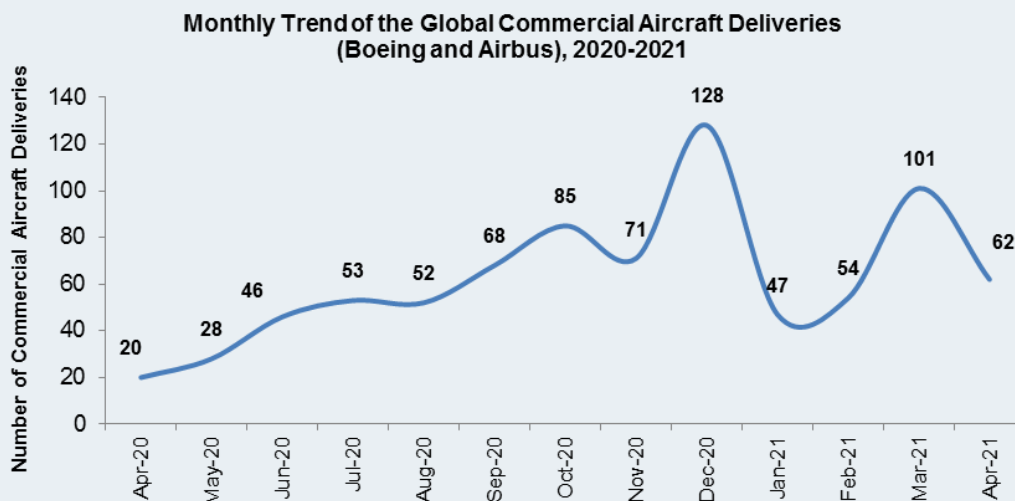


Composites Market Update for April 2021

The US Composites Market in April experienced challenges in key supply chains but demonstrated continued strong demand, maintaining the strong trend from previous months. However, due to fewer billing days and challenges accessing certain raw materials, April's performance was slightly down from March. April's performance was slightly ahead of April 2019 (most recent pre-COVID April), by roughly 3 to 4%. All sectors performed well, but leisure, marine and residential sectors were particularly strong. May is expected to be slightly down compared to April, but not as a result of lessening demand. Supply challenges continue to be problematic with particular challenges in epoxy, vinyl esters, and other materials spiking in price and/or becoming short in supply. There have also been related challenges with regards to drums for materials, freight and logistics, and importing-related challenges leading to slow-downs at ports of entry. Supply chain and raw material challenges continue to be the most significant external factor, as the impact of COVID wanes.

Aerospace

Commercial aircraft (Boeing and Airbus) deliveries decreased from 101 aircraft deliveries in March, 2021, to 62 aircraft deliveries in April, 2021.



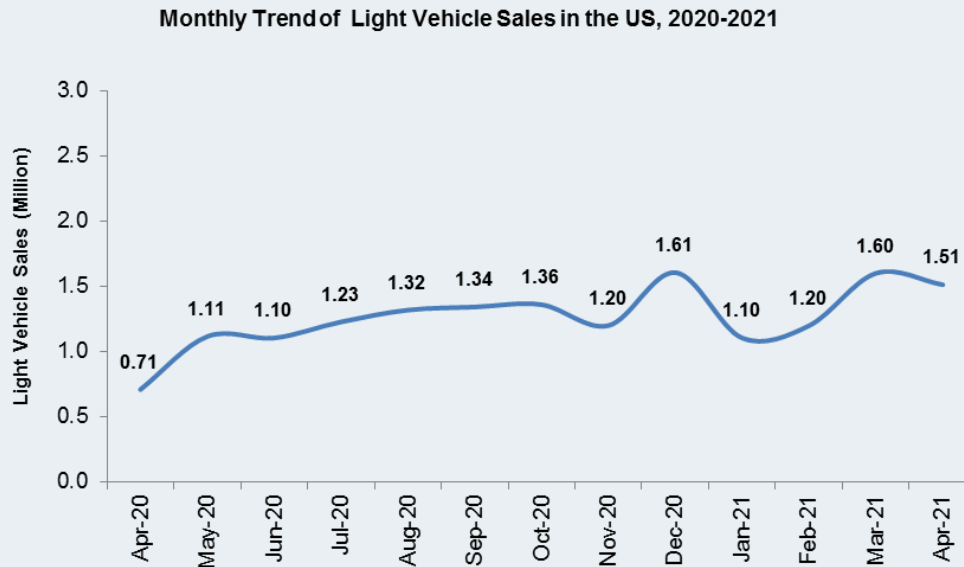
Some highlights of April, 2021, are as follows:

- Wing of Tomorrow Ribs: One-shot, Thermoplastic, OOA Consolidation.** GKN Aerospace has been very active in the WOT program, including the development of a wing spar demonstrator made via resin transfer molding (RTM) and four aluminum wing ribs. Another technology demonstrator recently delivered by GKN Aerospace involved the development of both a cost-competitive thermoplastic composite rib, and an innovative, modular press system for one-shot, out-of-autoclave (OOA) manufacturing to produce it.

- Bye Aerospace, L3Harris Technologies Team Develop All-Electric Multi-Mission Composite Aircraft.** Combined team will modify eFlyer 800, evaluate configurations for zero emissions and low operating cost for multi-modal military applications. This aircraft will also be taking advantage of composite materials. The range and speed of the eFlyer 800 is achievable with a low profile and lightweight airframe that will utilize the latest advancements the composites industry.

Automotive

The U.S. new vehicle sales of 1,512,186 units in April, 2021, represented an increase of 111% as compared to 715,322 in April, 2020.



Some highlights of April, 2021, are as follows:

- Ford Mustang Shelby GT500 Features New Composite Parts.** Ford Performance Parts (Dearborn, Mich., U.S.) has developed four new aftermarket carbon fiber components for the GT500 that are separate from the components making up the Shelby GT500 Carbon Fiber Track Package. The composite hood vent and rain tray kit cuts the weight from eight pounds to four.
- Increasing Demand for Composite Driveshafts Leads to Automated Production.** Composites fabricator Advanced Composites Products & Technology Inc. (ACPT, Huntington Beach, Calif., U.S.) has worked diligently to develop and perfect its design for carbon fiber composite driveshafts — carbon fiber composite or metal tubes connecting the front and rear parts of the drivetrain underneath most vehicles.
- Composites as Auto-Body Reinforcements.** Composites have made some inroads in automotive body-in-white (BIW) structures, materials use in this area of the vehicle have long

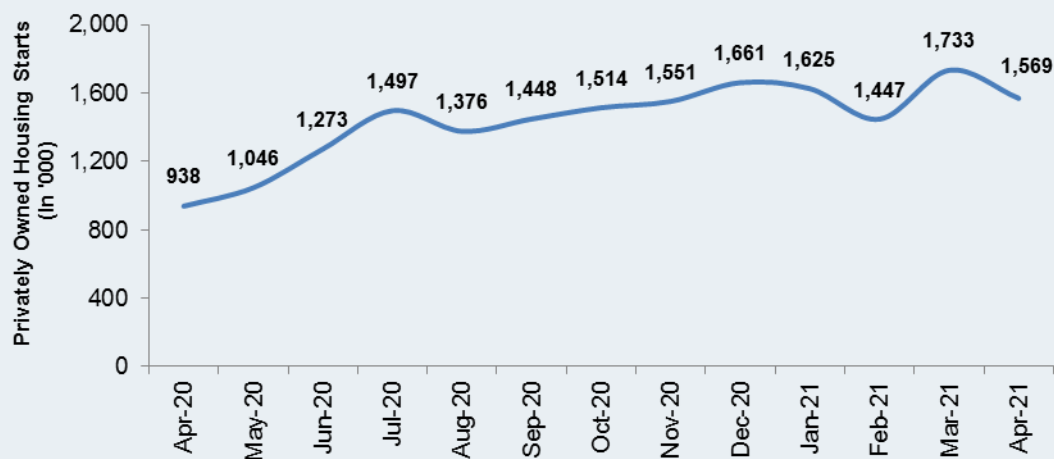
been dominated by steel and, more recently, aluminum. Because of this, automakers rely heavily on welding and mechanical fasteners like bolts and screws to join metallic structures.

- **Huntsman PU Resin Systems Enable Lightweight Sandwich Construction for Automotive.** Huntsman Polyurethanes composites team has devised a special ‘package’ approach that combines its Vitrox RTM and Rimline FC PU systems. The result is an integrated product offering that can give automotive equipment manufacturers advantages in terms of light-weighting, design freedom, and simplified manufacturing.
- **WEAV3D, GAA Partner to Expand Structural Composite Opportunities in Automotive Sector.** WEAV3D Inc. has partnered with Global Alliance Automotive AG to promote the use of WEAV3D’s lightweight, locally tunable structural composites in the automotive industry. These materials are said to be a cost-effective alternative to traditional composites, steel and aluminum, and can increase vehicle fuel economy and electric vehicle (EV) range.

Construction

Privately-owned housing starts in April were at a seasonally adjusted annual rate of 1,569,000. This is 9.5% below the revised March estimate of 1,733,000, but is 67.3% above the April 2020 rate of 938,000. Single-family housing starts in April were at a rate of 1,087,000; this is 13.4% below the revised March figure of 1,255,000. The April rate for units in buildings with five units or more was 470,000.

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



Some highlights of April, 2021, are as follows:

- **Bedford Reinforced Plastics Launches FRP Structure Line.** Bedford Reinforced Plastics, a full-service supplier offering an extensive line of fiberglass-reinforced plastic (FRP) products and services, launch of ReadySeries, a quick-ship, easy-to-install modular solution to meet access and safety structure needs. ReadySeries is said to be the first modular system of this magnitude made of FRP.

- **New Tennessee FRP Bridge to Promote Composites Use for Rural Infrastructure.** Embedded fiber-optic sensors to give IACMI and industry partners critical performance and safety data of composite bridge deck, promote federal, state and local adoption of composites. Equipped with a fiber-reinforced polymer (FRP) bridge deck embedded with fiber-optic sensors, it has replaced a damaged, decades-old concrete crossing which, like thousands of rural, low-volume bridges across the state and nation, was rated structurally deficient and outdated.
- **FCI-Marbocote Develops Anti-Corrosion Coating Suitable for Contact with Drinking Water.** FCI-Marbocote has launched its own coating for tanks that store drinking water. Named Ycon CS Acqua, the product was developed at the request of Vantare, a manufacturer of modular composite tanks. After being applied, Ycon CS Acqua promotes a film of high thickness and totally inert in contact with water.

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 11 units during January-March 2021 was 2,921 MW as compared to 2,148 MW of 26 units during January-March, 2020. With a total installed generating capacity of 124.80 (GW), wind constituted 10.16% of the total installed generating capacity of 1,228.88 (GW) among all energy sources.

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

- **Carbon Fiber Wind Turbine Blades Could Reduce Cost.** Sandia National Laboratories has released a new study which suggests that a new carbon fiber material could bring cost and performance benefits to the wind industry if developed commercially. According to the company, wind blades containing carbon fiber weigh 25% less than ones made from traditional glass fiber materials. That means carbon fiber blades could be longer than glass fiber ones and capture more energy in locations with low wind. A switch to carbon fiber could also extend blade lifetime because carbon fiber materials have a high fatigue resistance.

Marine

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

Some highlights of April, 2021, are as follows:

- **Éirecomposites and ORPC to Use Recycled Carbon Fiber in Tidal Turbine Foils.** Leading Irish design, manufacturing and testing company, ÉireComposites, global marine renewable energy solutions company, ORPC and National University of Ireland Galway have launched a new project to develop and market a state-of-the-art marine hydrokinetic (MHK) turbine based on ORPC's proven, proprietary design. When in operation, this innovative MHK power system will produce clean energy at a reduced cost, while increasing reliability and performance of electricity output. The CRIMSON project plans to bring to market ORPC's reliable, sustainable

river and tidal turbine with foils made entirely of recycled carbon fiber, while also reducing capital expenditure and operating expenditure by 33% and 66%, respectively.

- **Cobra International Commissions Prepreg Compression Molding Production Line.** This new production capacity delivers prepreg carbon fiber parts with a final surface finish straight from the mold tool. Production capacity delivers highly structural prepreg carbon fiber hydrofoil components with a final surface finish straight from the mold. There are three key aspects of our new compression molding production that offer major benefits to customers.

Consumer Goods

New orders for manufactured durable goods in March increased \$1.4 billion or 0.5% to \$256.3 billion, the U.S. Census Bureau announced today. This increase, up ten of the last eleven months, followed a 0.9% February decrease. Excluding transportation, new orders increased 1.6%. Excluding defense, new orders increased 0.5%. Fabricated metal products, up six of the last seven months, led the increase, \$1.2 billion or 3.6% to \$35.4 billion.

Some highlights of April, 2021, are as follows:

- **Aluminum Bonds with Carbon over New Rechargeable Battery.** This new kind of battery could provide a safer and more environmentally friendly alternative to lithium-ion batteries, which currently dominate the market but are slow to charge and have a knack for catching fire. The researchers' solution was to design a substrate of interwoven carbon fibers that forms an even stronger chemical bond with aluminum. When the battery is charged, the aluminum is deposited into the carbon structure via covalent bonding, i.e. the sharing of electron pairs between aluminum and carbon atoms.
- **Sustainable Carbon Fiber Cylinders in the Antarctic.** Hexagon Digital Wave, part of the Hexagon Group, has been selected by the Antarctic Fire Department to perform continued service life testing on carbon fiber self-contained breathing apparatus cylinders (SCBA).

Recent Developments in Materials

- **Ricoh 3D Launches Powder-Based 3D Composite.** A leading 3D printing specialist has introduced carbon fiber composites to its line-up of high-performance materials through a partnership with composite-based manufacturer Impossible Objects. The unique printing process leverages high-speed 2D graphics technology to create a high performance, reinforced composite part. The end result is extremely cost-effective parts with impressive strength-to-weight ratios and a performance similar to that of metals. Compared to traditional composite manufacturing, Impossible Objects' Composite Based Additive Manufacturing (CBAM) process creates much stronger parts with very few geometric restrictions, at significantly lower prices than have been possible before.
- **Green Science Alliance Developed Nano Cellulose Composite with Biomass Polyethylene and Biomass Polyamide.** This time, Dr. Ryohei Mori had developed nano cellulose composite with biomass polyethylene and biomass polyamide which belong to the above 3rd category. Biomass polyethylene has been applied partly as material for shopping bag recently and usage and consumption of biomass polyethylene is increasing. This material is contributing to the

fact of reducing CO2 consumption because they are made from plant biomass, not petroleum. So that it is possible to enhance the mechanical strength of shopping bag made of biomass polyethylene. As such, it is meaningful to making biomass polyethylene and biomass polyamide to be stronger, with nano cellulose because they are also derived from biomass.

- TRB Lightweight Structures Manufactures Prepreg Materials to Streamline Part Production.**
 TRB Lightweight Structures has begun manufacturing its own prepreg material to improve performance, cost and lead times for its composite parts. The company has already produced and shipped 25,000 parts using this proprietary, rapid-cure prepreg technology. TRB has emphasized that it is not selling its prepreg commercially, but is instead focused on streamlining its production process for the components it manufactures. This allows the company to decrease costs and lead times – by reducing the number of vendors involved and eliminating minimum order quantities – while also improving manufacturing efficiency.

Recent Product Launches in the Composites Market

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

Product	Company Name	Description
Structural Battery	Swedish University	The structural battery, designed by Professor Leif Asp's team at Chalmers University, combines carbon fiber as a negative electrode, and a lithium iron phosphate-coated aluminum foil as the positive electrode, separated by a glass fiber separator in a structural battery electrolyte matrix material. The carbon fiber anode and the electrolyte support structural loads and move ions, while the cathode conducts electrons and hosts the lithium-ions. The carbon fiber stores energy and since it conducts electrons, eliminates the need for heavier copper and silver conductors. The glass fiber weave used, at 25.5 GPa, achieved exception stiffness to help support the structural loads.
Solid-State Batteries	Blackstone Resources AG	Blackstone Technology's 3D-printing and solid-state battery offers substantial advantages over conventional battery cell designs which use liquid electrolytes. It allows significantly lower costs during production, increases energy density of the cells, and offers a higher number of charging cycles.

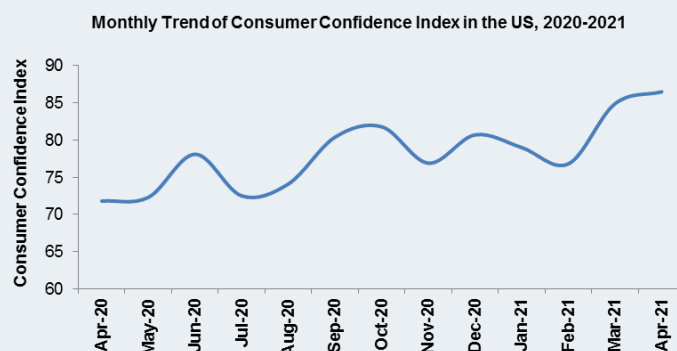
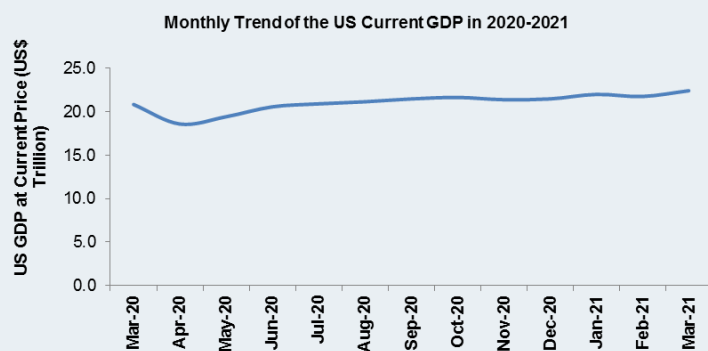
The US Economic Overview – April, 2021

The US Consumer Confidence Index increased to 86.5 in April, 2021, as compared to 84.9 in March 2021. The GDP at current price of the US increased from US \$21.8 trillion in February, 2021, to US \$22.4 trillion in March 2021.

Real gross domestic product (GDP) increased at an annual rate of 6.4% in the first quarter of 2021, according to the "advance" estimate. The increase in real GDP in the first quarter reflected increases in personal consumption expenditures (PCE), nonresidential fixed investment, federal government spending, residential fixed investment, and state and local government spending.

The increase in first quarter GDP reflected the continued economic recovery, reopening of establishments, and continued government response related to the COVID-19 pandemic. In the first quarter, government assistance payments, such as direct economic impact payments, expanded unemployment benefits, and Paycheck Protection Program loans, were distributed to households and businesses through the Coronavirus Response and Relief Supplemental Appropriations Act and the American Rescue Plan Act. The full economic effects of the COVID-19 pandemic cannot be quantified in the GDP estimate for the first quarter of 2021 because the impacts are generally embedded in source data and cannot be separately identified.

The price index for gross domestic purchases increased 3.8% in the first quarter, compared with 1.7% in the fourth quarter. The PCE price index increased 3.5%, compared with an increase of 1.5%. Excluding food and energy prices, the PCE price index increased 2.3%, compared with an increase of 1.3%.



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