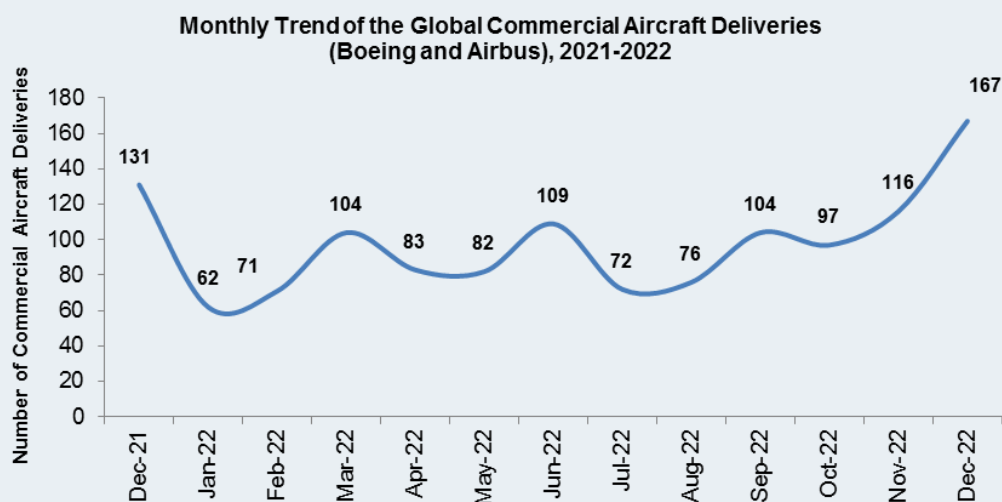


Composites Market Update for December, 2022

The composites market in December was particularly weak and was down roughly 20% from a year-over-year (YoY) perspective. December 2021 was particularly strong, but there has been a softening in the composites market for the past few months. The early indication is that January will also be down roughly 10% YoY, but this trend may change. It's clear that demand is weakening for composites overall. Construction, distribution, and RV are all significantly down from the prior year. Other industries, like industrial and transportation, were down only slightly. Because of this softening in demand, we are seeing better accessibility and more price competition for raw materials, which is driving costs down slowly but steadily over the past few months. Any impact to the cost of oil and natural gas can still hurt the market, so the war in Ukraine remains an important variable. The biggest external concern is the state of the macro economy, including interest rates, which have a major impact on leisure spending and investments in housing.

Aerospace

Commercial aircraft (Boeing and Airbus) deliveries increased from 116 aircraft deliveries in November 2022 to 167 aircraft deliveries in December 2022.



Some of the highlights of December 2022 are as follows:

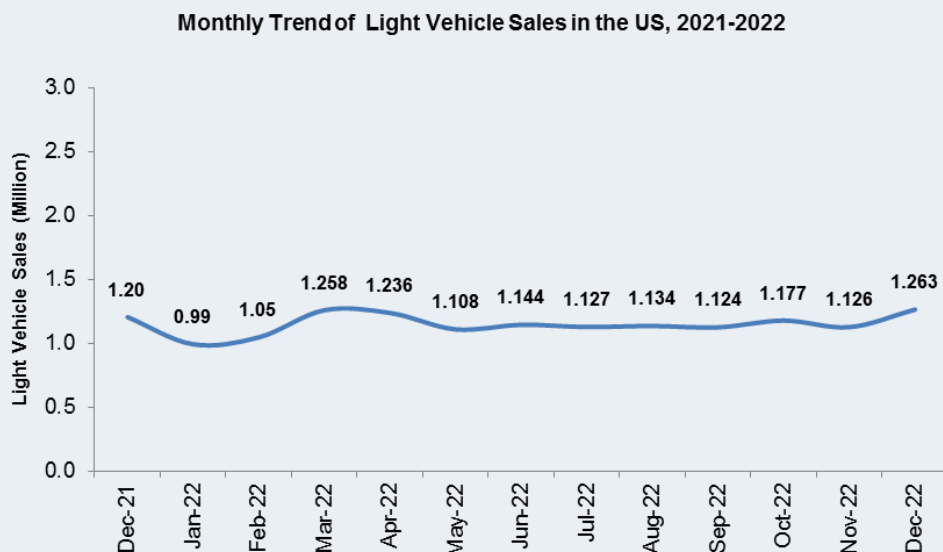
- BBG Supplies Electric Composite Press for Aircraft Interior Parts Production.** Industrial equipment supplier BBG GmbH & Co. KG supplied an electric composite press for the manufacture of aircraft interior parts to a reputed aerospace company in the U.S. The cooperation between the two companies goes back to a project managed by U.S. subsidiary BBG North America. Composite prototype parts were produced for the aircraft manufacturer at the BBG technical center at Oxford, Mich, U.S., and, satisfied with the production

technology; the aerospace company ordered a pilot plant, including the molds, for the production of lightweight components.

- H3 Dynamics, Carbonix to Build Australia's First Hydrogen VTOL Unmanned Aircraft.** H3 Dynamics and Australian unmanned aerial vehicle (UAV) producer Carbonix are coming together to begin development and production of what is reported to be the first Australian hydrogen-electric vertical takeoff and landing (VTOL) unmanned aircraft system (UAS). Carbonix has extensive expertise in advanced composite manufacturing, aero structure design and control systems for vertical and landing capabilities.

Automotive

The U.S. new vehicle sales of 1,263,268 units in December 2022 represented an increase of 5% as compared to 1,203,993 units in December 2021.



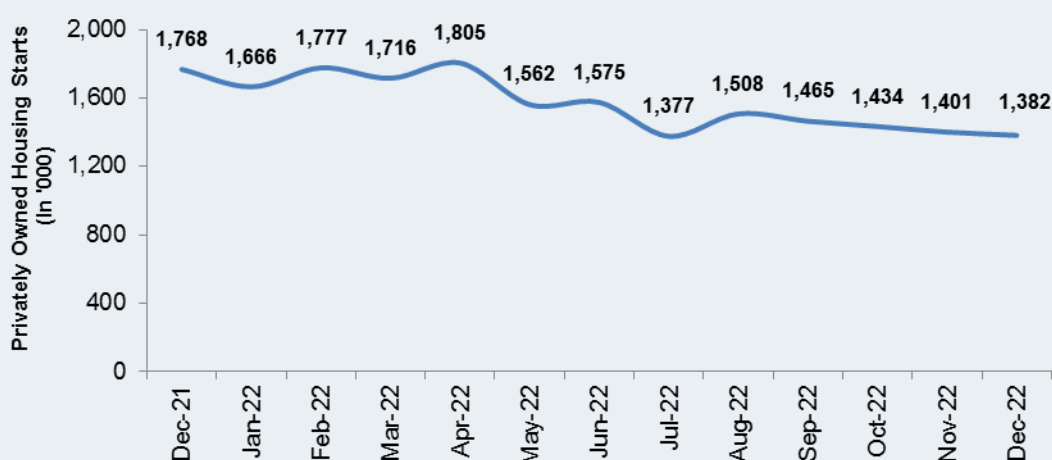
One of the highlights of December 2022 is as follows:

- Limited Edition Ford GT Highlights Carbon Fiber Aesthetics.** Ford Motor Co. is nearing completion of the production of the Ford GT; it is producing 20 special editions that call attention to the carbon fiber that is used for the vehicle's body. For example, there is the option to have exposed red- or blue-tinted carbon fiber for the front splitter, side and door sills, engine bay louvers, mirror stalks and rear diffuser. Another option is 20-inch carbon fiber wheels with a gloss finish over the exposed weave. On the inside, the carbon fiber seats are wrapped with Alcantara, a soft, suede-like microfiber material.

Construction

Privately-owned housing starts in December were at a seasonally adjusted annual rate of 1,382,000. This is 1.4% below the revised November estimate of 1,401,000 and is 21.8% below the December 2021 rate of 1,768,000. Single-family housing starts in December were at a rate of 909,000, this is 11.3% above the revised November figure of 817,000. The December rate for units in buildings with five units or more was 463,000.

Monthly Trend of Privately Owned Housing Starts in the US, 2021-2022



One of the highlights of December 2022 is as follows:

- **National Composites Centre Releases Results for Life Cycle Assessment Tools for Construction.** The NCC has completed an assessment of the composites data referenced in software and tools for Life Cycle Assessments (LCA) used within the Construction sector. As the construction industry looks to capitalize on the benefits that composite materials might bring to projects, there is an increasing need to account appropriately for composite materials in the assessment tools for carbon accounting. In the study undertaken by the NCC, it was found that the carbon footprint of a glass fiber composite output from one tool could be almost double for the same assessment used in a different tool. The result is that when applied in a decision-making process in early design stages, these diverse values can force a different outcome depending on the tool used.

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 39 units during January – November, 2022 was 8,253 MW as compared to 10,321 MW of 60 units during January – November, 2021. With a total installed generating capacity of 143.02 (GW), wind constituted 11.36% of the total installed generating capacity of 1,258.55 (GW) among all energy sources.

Some of the highlights of December 2022 are as follows:

- **New Vestas Business Provides Automated Blade Leading Edge Maintenance Solution.** Renewable energy company Vestas has launched Blade Robots, a new standalone business with an automated robotic technology solution that will enable more efficient and scalable blade leading edge maintenance for wind turbines. Vestas claims that the robotic solution is capable of adapting to all types of wind blades, offering availability on multi-brand applications, in addition to safety and quality for technicians involved. Moreover, it has been reported that Blade Robots provides maintenance up to four times faster than traditional manual methods.
- **Covestro and Zhuzhou Times New Material Technology Launch Their 1000th Polyurethane Wind Rotor Blade.** Covestro and TMT signed a memorandum of cooperation about a year ago, based on which significant commercialization results have been achieved. PU wind turbines are now being used in commercial wind farms throughout China. PU wind blades cater to the growing demand for longer wind blade designs. TMT produces PU wind blades ranging from 59.5 meters to 94 meters in length with different blade designs and layup structures to meet the growing demand for longer and larger wind blades. The 94-meter wind turbine blade, capable of generating 8 MW of energy, is the largest PU application for Covestro so far.

Marine

The US marine industry experienced good growth in 2022.

One of the highlights of December 2022 is as follows:

- **SeaBioComp Project Develops Bio-composite Demonstrator Products for Marine Applications.** SeaBioComp, a collaborative project that aims to develop and produce novel bio-based composite materials to replace conventional oil-based products in the maritime industry, has successfully produced a number of demonstrator products for the marine environment using different manufacturing processes — to showcase its flax-based thermoplastic bio-composites. From these efforts, two different kinds of bio-composites have been developed; a self-reinforced poly lactic acid (PLA) composite which has been made into a variety of nonwoven and woven fabrics suitable for use in compression molding, and a flax fiber-reinforced PLA or acrylic (PMMA)-reinforced composite for use via RIFT, compression molding and additive manufacturing (AM).

Consumer Goods

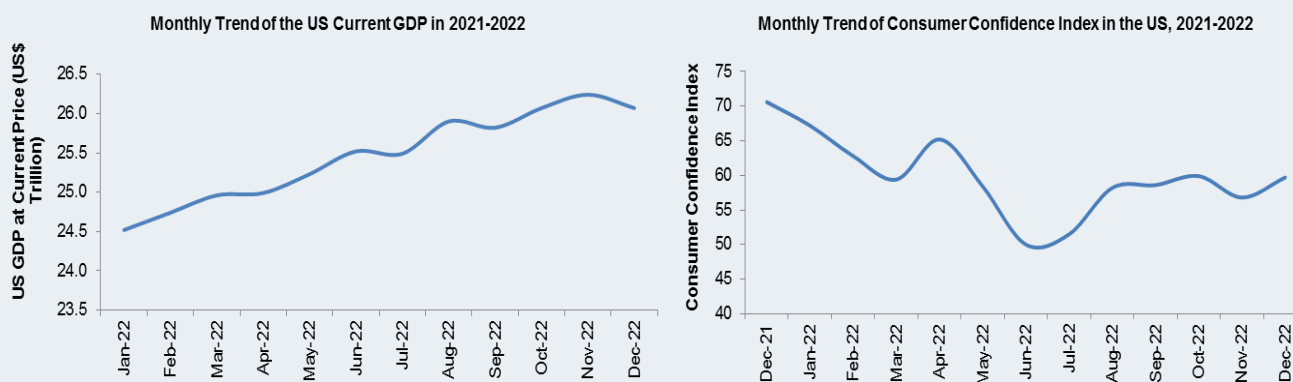
New orders for manufactured durable goods in December, up four of the last five months, increased \$15.3 billion or 5.6% to \$286.9 billion, according to the U.S. Census Bureau. This followed a 1.7% November decrease. Excluding transportation, new orders decreased 0.1%. Excluding defense, new orders increased 6.3%. Transportation equipment, also up four of the last five months, drove the increase by \$15.5 billion or 16.7% to \$108.1 billion.

The US Economic Overview – December 2022

The US Consumer Confidence Index increased to 59.7 in December 2022 as compared to 56.8 in November 2022. The GDP at current price of the US decreased from US \$26.24 trillion in November 2022 to US \$26.07 trillion in December 2022.

Real gross domestic product (GDP) increased at an annual rate of 2.9% in the fourth quarter of 2022, according to the "advance" estimate. The increase in real GDP reflected increases in private inventory investment, consumer spending, federal government spending, state and local government spending, and non-residential fixed investment that were partly offset by decreases in residential fixed investment and exports. Imports, which are a subtraction in the calculation of GDP, decreased.

The price index for gross domestic purchases increased 3.2% in the fourth quarter as compared with an increase of 4.8% in the third quarter. The PCE price index increased 3.2% as compared with an increase of 4.3%. Excluding food and energy prices, the PCE price index increased 3.9% as compared with an increase of 4.7%.



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