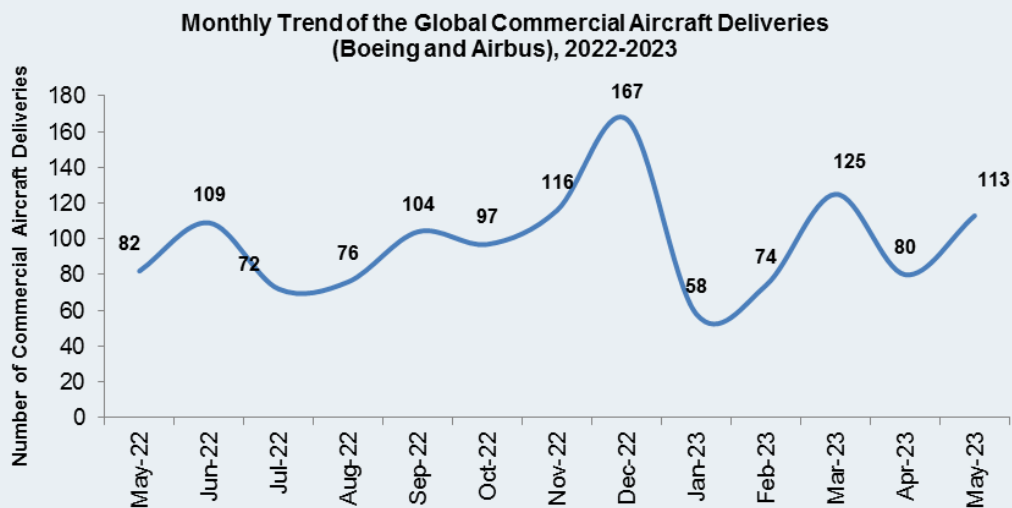


Composites Market Update for May 2023

The composites market in May was down over 10% as compared to May 2022. However, the market rose about 6% in May 2023 from April of this year. In May, the infrastructure sector rose about 10%, driven by applications, such as 5G communications, and leisure edged up. Marine and RVs showed mixed results and remained among the cautious sectors. RV sales mushroomed during the pandemic. In May, construction remained sluggish, and there was minimal fluctuation in raw material prices in May. June and July may have some headwinds to sustaining the growth due to a very strong June 2022 and plant closures expected in July. However, customers are not moving to other materials, as composites have key benefits, such as improved strength, durability, and weight reduction. A rebound may be in the offing around the latter part of this year or possibly sooner, as macro forces, such as lower interest rates, increased housing starts, and rising national income fueling increased discretionary spending, become more favorable. Among the positive signs, in June, the Federal Reserve benchmark federal funds rate remained in the range of 5% to 5.25%, unchanged for the first time since March 2022. However, more rate hikes appear likely, although potentially of less magnitude. 15 year and 30 year fixed mortgage rates in the US trended lower in June. US light vehicle sales reached 2.299 million units in May 2023, representing a gain of about 28% as compared to May 2022, according to Federal Reserve Bank of St. Louis. Privately-owned housing starts rose 21.7% in May as compared to April and rose 5.7% above May 2022, according to the US Census Bureau and US Department of Housing and Urban Development.

Aerospace

Commercial aircraft (Boeing and Airbus) deliveries increased from 80 aircraft deliveries in April 2023 to 113 aircraft deliveries in May 2023.

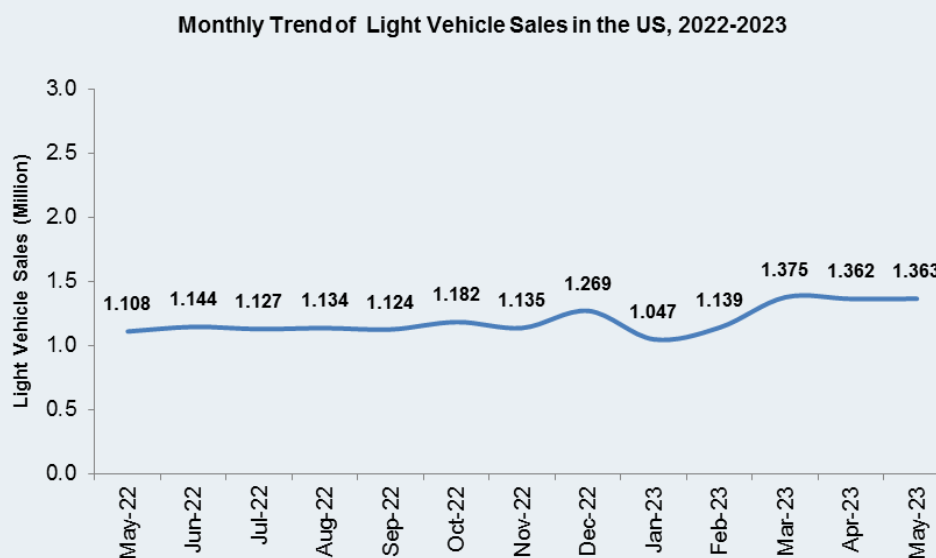


Some of the highlights of May 2023 are as follows:

- Airbus Selects Airborne to Supply an Automated Ply Placement System.** Airborne was selected by Airbus to supply an Automated Ply Placement (APP) system to the Getafe production plant, to manufacture the dry fiber preforms for RTM structures. This will be the first time a pick & place based system is used in Airbus factories, reflecting the leading position that Airborne is building for Automated Ply Placement. The system is planned to be used for the automated production of the preforms for the A350 rear fuselage beams and maintenance door frame, made of UD and fabrics. Dry fiber composites are an efficient method to manufacture complex, highly loaded primary structure.
- Hexcel Expands in Morocco with New Engineered Core Operations Plant.** Hexcel Corporation apprised of the opening of a completed expansion at its engineered core operations plant in Morocco to meet the growing demand for lightweight advanced composite materials for the aerospace industry. The Casablanca facility is part of Hexcel's ongoing worldwide investment to create a diversified and robust global supply chain to support aerospace customers' growing demand for engineered core.

Automotive

The U.S. new vehicle sales of 1,363,272 units in May 2023 represented an increase of 23% as compared to 1,108,063 units in May 2022.



One of the highlights of May 2023 is as follows:

- TPI Composites and Helicoid Industries Collaborate to Design Bio-Inspired Lightweight EV Underbody Protection Panel.** TPI Composites, Inc., (TPI) and Helicoid Industries Inc. collaborated to design a bio-inspired lightweight EV underbody protection panel using Helicoid technology. The solution leverages digital engineering, unconventional layup scenarios, biomimicry, advanced multiaxial intelligent weaving, and automated manufacturing to deliver a durable, low-cost, highly engineered automotive part for the commercial and consumer automotive markets. Composite underbody panel for battery pack protection, made of stacked multiaxial no crimp fabric, will serve high-volume commercial and automotive markets.

Construction

Privately-owned housing starts in May 2023 were at a seasonally adjusted annual rate of 1,631,000. This is 21.7% above the revised April estimate of 1,340,000 and is 5.7% above the May 2022 rate of 1,543,000. Single-family housing starts in May were at a rate of 997,000; this is 18.5% above the revised April figure of 841,000. The May rate for units in buildings with five units or more was 624,000.

Monthly Trend of Privately Owned Housing Starts in the US, 2022-2023



Some of the highlights of May 2023 are as follows:

- Sireg Geotech Fiberglass Rebar Supports Italian Bridge Reconstruction.** Sireg Geotech, a manufacturer and exporter of non-metallic and composite products for geotechnical and civil engineering sectors, is working alongside Manini Prefabbricati SpA for the reconstruction of a reinforced concrete bridge in Europe prestressed with glass fiber-reinforced polymer (GFRP) rebar. The bridge is said to be the first of its kind, having both the slab and the deck beams prestressed with stirrups and flexural reinforcement made of glass fiber rebar.

- **Creative Composites Group achieves EPD for StormStrong Utility Poles.** Parameters of the EPD include primary energy use as well as resource use, including materials, fuels and water. StormStrong composite utility poles are lightweight, designed for grid hardening and are engineered for the current and future sustainability requirements of the utility industry, containing no chemicals or additives that can harm humans or the environment.

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 - April 2023 was 1,967 MW as compared to 5,161 MW of 23 units during January – April 2022. Wind energy with a total installed generating capacity of 146.90 (GW) constitutes 11.55% among all energy sources (1,271.51 GW).

One of the highlights of May 2023 is as follows:

- **METYX Group Signs 100 Million Euro Supply Agreement.** METYX recently signed a multi-year material supply agreement with a global wind blade supplier. This includes e-glass, carbon reinforcements, core & fabric kit, consumables, and components. This new contract has a three-year term and will generate a turnover exceeding 100 Million Euros for the METYX Group. METYX supports wind turbine blade production globally with world class service and leadership in the composite materials industry. METYX continues to invest in research and production to fulfill demands for its customers.

Marine

The US marine industry is anticipated to experience good growth in 2023.

Some of the highlights of May 2023 are as follows:

- **Dura Composites and Lakeland Leisure Collaborated in Replacing Decking with GRP at Great Haywood.** In its latest project, in partnership with longstanding collaborator Lakeland Leisure Estates, Dura Composites has replaced the decking at Great Haywood Marina in the U.K. with a glass fiber-reinforced polymer (GFRP) alternative. This latest completion marks more than 10,000 square meters of Dura Composites Mini Mesh Grating successfully designed, supplied, and installed. Degrading to the timber deck had occurred, and they were in need of a much longer lasting replacement. Dura Composites' GRP Mini Mesh was the perfect solution offering non-corrosion, non-conductive and anti-slip properties that far superseded the previous failing timber.

- **Thomas Tison, NLComp Head Biocomposite ecoFoiler Development.** French firm Thomas Tison Yacht Design & Engineering and Northern Light Composites, a Northern Light Sailing Team spin-off, are developing an ecoFoiler, a 3.80-meter foiling dinghy, made with NLComp's recyclable rComposite materials, with a focus on sustainability and performance. According to the partners, the ecoFoiler design will make it easy to handle before and after takeoff, unlike other high-performance foiling dinghies that can be challenging to sail and tend to fly very high. This feature makes it an ideal product for serious sailors of all levels, offering a thrilling sailing experience.

Consumer Goods

New orders for manufactured durable goods in May, up three consecutive months, increased \$4.9 billion or 1.7% to \$288.2 billion. This followed a 1.2% April increase. Excluding transportation, new orders increased 0.6%. Excluding defense, new orders increased 3.0%. Transportation equipment, also up three consecutive months, led the increase, \$3.9 billion or 3.9% to \$102.6 billion.

Some of the highlights of May 2023 are as follows:

- **Time Bicycles to Modernize Composite Bicycle Manufacturing.** Time Bicycles, a carbon fiber bicycle manufacturer, has been raced to victory in the Olympics, many stages of the Tour de France and multiple world championships. Time bicycle frames are made of multilayer braided carbon fiber sleeves and are handcrafted using resin transfers molding (RTM). The company is working closely with KraussMaffei to technically optimize its manufacturing process.
- **Running Shoe Insoles get a Lift with Thermoplastic Fiberglass Tapes.** The most recent product from composite sporting goods developer FlexiStiX LLC is a line of running shoe inserts featuring a layer of unidirectional (UD) continuous glass fiber-reinforced thermoplastic material to increase runner comfort, stride length, and speed. Aiming to make the lightest weight, highest durability athletic shoes available, there have been a number of carbon fiber composite midsoles and other shoe components on the market for years.

Recent Development in Materials

- **The National Composites Centre and the UK Atomic Energy Authority to Develop Fusion-Grade Silicon Carbide Ceramic Matrix Composites.** The collaboration between UKAEA and the NCC has resulted in a significant process innovation that reduces the cost of manufacturing to one fifth of what can currently be achieved whilst shortening cycle times. Haste-F also increases design freedom for fusion components by enabling more complex shapes and thicker sections than can be made via current manufacturing methods. These advances will allow engineers to access all the advantages of SiC/SiC at a far lower price point. Fusion energy will play an important role in delivering long term UK energy security, with the STEP (Spherical Tokamak for Energy Production) program aiming to construct the first grid-connected reactor by 2040.

- Huntsman Develops New Materials Designed to Boost Battery Performance and Protection.** Huntsman informed about the development of innovative polyurethane, carbon nanotube and epoxy materials at The Battery Show, which are all designed to help improve the integration of batteries into electric vehicles and enhance their protection and performance. In a move that helps to deliver high-performance composite battery structures, alongside design and production flexibility, Huntsman has assembled a portfolio of customizable, quick-cure, high-strength polyurethane and epoxy resins that can be used to create underbody and top cover battery protection components up to 30% quicker than some existing technologies. A range of products is currently available covering various battery performance and protection needs.

Recent Product Launches in the Composites Market

The following table represents new product launch in the composites market in May 2023.

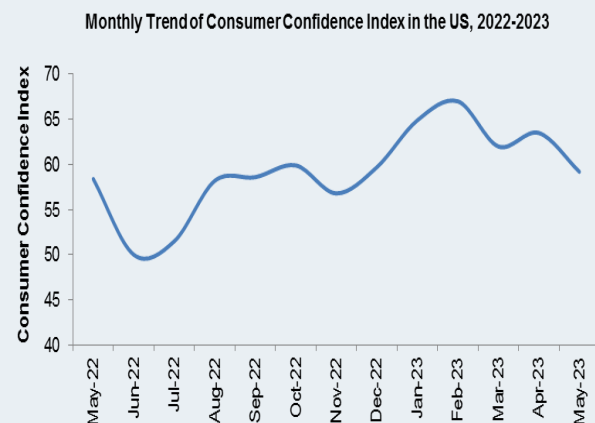
Product	Company Name	Description
Ventus S1 evo Z AS X	Hankook Tire	Hankook Tire has added a new ultra-high-performance all-season tire designed for SUVs to its comprehensive Ventus product line. The Ventus S1 evo Z AS X provides ultimate handling at high-speeds, excellent traction in all-season conditions, and uncompromised comfort for luxury SUVs. Created with motorsport technology, improved handling at high-speeds is possible with a reinforcement belt mixed with aramid fiber. The most advanced fiber available, aramid is four to five times stronger than steel and heat resistant, enabling improved steering performance and an optimized shape during high-speed driving.

The US Economic Overview – May 2023

The US Consumer Confidence Index decreased to 59.2 in May 2023 as compared to 63.5 in April 2023. The GDP at current price of the US increased from US \$26.56 trillion in March 2023 to US \$26.73 trillion in April 2023.

Real gross domestic product (GDP) increased at an annual rate of 2.0% in the first quarter of 2023, according to the "third" estimate. The increase in real GDP in the first quarter reflected increases in consumer spending, exports, federal government spending, state and local government spending, and non-residential fixed investment that were partly offset by decrease in private inventory investment and residential fixed investment. Imports increased.

The price index for gross domestic purchases increased 3.8% in the first quarter of 2023, the same as the previous estimate. The personal consumption expenditures (PCE) price index increased 4.1%, revised down 0.1% point. The PCE price index, excluding food and energy prices, increased 4.9%, a downward revision of 0.1% point.



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