

Composites Market Update for November 2023

The composites industry, a sector vital to various applications ranging from marine to infrastructure, is currently navigating a challenging landscape marked by significant downturns. The industry has experienced an overall year-to-year decline of about 11%, with pronounced reductions in key sectors. The marine sector, critical for its high-value applications, has seen a production output reduction by 20%-40%. This stark decline is indicative of broader economic pressures impacting discretionary spending in sectors reliant on consumer confidence and economic stability.

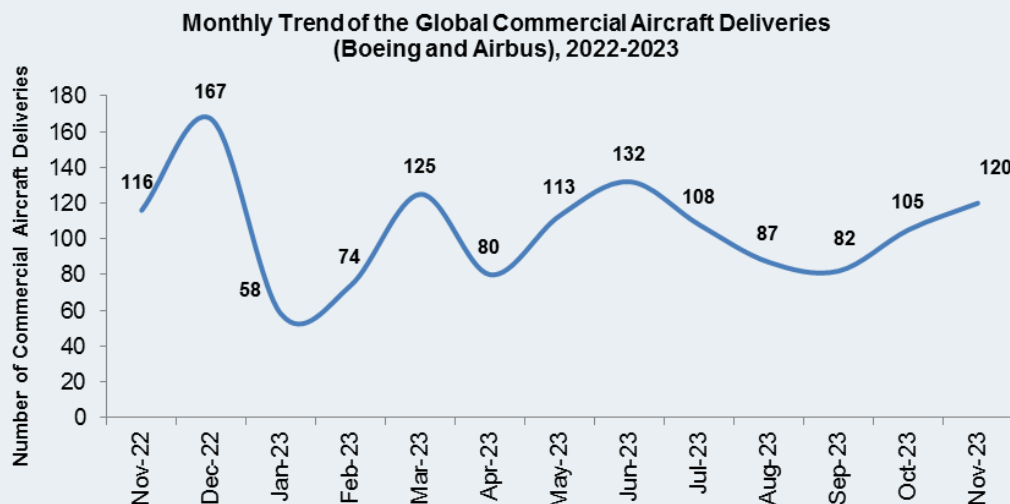
The recreational vehicle (RV) sector, another major composites consumer, also reported a substantial downturn, with decreases ranging from 40%-45%. This significant reduction is largely attributed to high inventory levels and a consequential reduction in new material purchases, reflecting cautious consumer spending and market saturation. The infrastructure sector, often seen as a bellwether for economic activity, has also experienced variable performance, heavily influenced by individual customer decisions and inventory management, highlighting the sector's sensitivity to broader economic trends.

Furthermore, the construction sector, a key area of composites application, has recorded a 10% decrease, mirroring the challenges faced by the broader industry. This decline is reflective of shifting market demands and economic pressures that are reshaping the landscape for composites applications. The transport and distribution sectors, integral to the supply chain and logistics of composites, have not been immune to these challenges, recording declines of 10% and 15% respectively. This pattern extends to the infrastructure sector, which surprisingly showed a 10% reduction in November as compared to the previous year. Overall, the industry's performance has dropped by approximately 10% year-to-date.

This downturn represents not just challenges but also opportunities for innovation and adaptation. The current landscape demands that companies in the composites industry reassess their strategies, adopt new technologies, or pivot to emerging markets to remain competitive. The need for strategic realignment is paramount in a rapidly evolving economic environment. This period of uncertainty could be a catalyst for innovation, driving the industry towards developing new applications for composites, focusing on cost-efficiency and adopting sustainable practices. The situation underscores the importance of agility and adaptability in business strategies, highlighting the need for companies to be proactive in anticipating market shifts and responsive in adjusting their operations accordingly. In conclusion, while the composites industry faces a period of significant challenges, it also stands at the brink of transformative opportunities that could redefine its future trajectory.

Aerospace

Commercial aircraft (Boeing and Airbus) deliveries increased from 105 aircraft deliveries in October 2023 to 120 aircraft deliveries in November 2023.

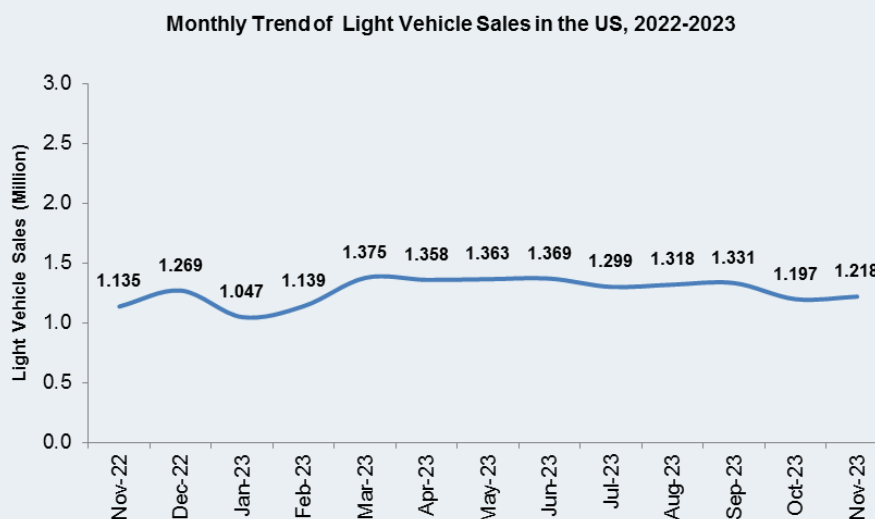


Some of the highlights of November 2023 are as follows:

- Paramount and AAL Group Successfully Complete First Testing Phase of Composite Blades for Mi-Type Helicopters.** Paramount, the global aerospace and technology company, and its strategic partner AAL Group Ltd, have successfully completed the initial testing stage of their innovative composite helicopter blades for Mi-type helicopters. The composite blades were successfully tested in the UAE by AAL Group Composite. AAL's team, in strategic partnership with Paramount, will continue the testing process to achieve full qualification. This significant achievement represents a pivotal step towards the planned commencement of composite blade production at AAL's MRO facilities in Sharjah, UAE. The composite blades, with technical characteristics surpassing those of legacy metal blades, offer new benefits for operators. Notably, they allow for the replacement of individual damaged blades, rather than the entire set, ensuring cost-efficiency and minimal downtime.
- Honeywell to provide Emirates with Wheels, Brakes for A380 Aircraft Fleet.** Honeywell Aerospace has been selected by Emirates airline to provide wheels and carbon/carbon brakes for its fleet of 116 Airbus A380 aircraft. Honeywell's wheel and braking designs save weight reduce maintenance costs and help extend overall brake life, further aided by its advanced design capabilities, including structural, thermal and dynamic analysis. Under the terms of the 10-year agreement, maintenance of the wheels and brakes will be performed through Emirates maintenance shops, ensuring continued maintenance support in Dubai.

Automotive

The U.S. new vehicle sales of 1,218,395 units in November 2023 represented an increase of 7% as compared to 1,135,484 units in November 2022.



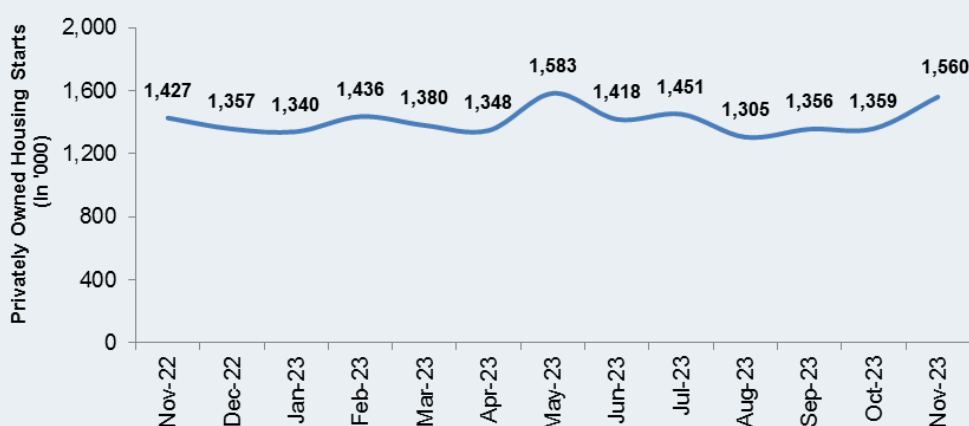
One of the highlights of November 2023 is as follows:

- **Teijin Automotive receives AME Award of Excellence.** The Association for Manufacturing Excellence awarded Teijin Automotive Technologies' Lenoir, N.C., U.S. facility with its prestigious AME Excellence Award. The Teijin Automotive facility is reported to be the world's first composites and molding manufacturing facility to win this award. The AME Excellence Award recognizes manufacturing facilities that demonstrate excellence in manufacturing and business operations. The award criteria detail a lean systems model for enterprise excellence. The primary focus of the award is to acknowledge continuous improvement, best practices, creativity and innovation.

Construction

Privately-owned housing starts in November 2023 were at a seasonally adjusted annual rate of 1,560,000. This is 14.8% above the revised October estimate of 1,359,000 and is 9.3% above the November 2022 rate of 1,427,000. Single-family housing starts in November were at a rate of 1,143,000; this is 18.0% above the revised October figure of 969,000. The November rate for units in buildings with five units or more was 404,000.

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



One of the highlights of November 2023 is as follows:

- Creative Composites Group Acquires United Fiberglass of America.** Creative Composites Group, a manufacturer of fiber-reinforced polymer (FRP) composites, has acquired the assets of United Fiberglass of America, Inc., a manufacturer of quality fiberglass pipes, conduit and bridge drain infrastructure systems. Using advanced manufacturing technologies and processes, UF provides durable fiberglass conduit products to support public utility, transportation, commercial and technology industries. Fiberglass conduit is a cost-efficient and environmentally sustainable alternative to steel, PVC, clay, copper and other conduit pipe materials and offers benefits such as light weight, corrosion resistance, fire resistance, durability and non-conductivity.

Wind Energy

As per the most recent "Energy Infrastructure Update" released by the Office of Energy Projects within the Federal Energy Regulatory Commission, wind energy with the combined installed capacity of 25 units from January to October 2023 amounted to 3,748 MW. This is in contrast to the 7,687 MW generated by 46 units during the same period in 2022. Wind energy, with an aggregated generating capacity of 148.60 GW that contributes 11.63% to the total energy sources, amounted to 1,277.78 GW.

One of the highlights of November 2023 is as follows:

- **Fraunhofer IFAM's PeelPLAS Release Film Increases Efficiency of Rotor Blade Production for Wind Turbines.** By developing release agent-free process and material systems in the sub-project "Release film technology for optimized rotor blade production" of the joint project "OptiBlade", researchers at the Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM, together with their partners Olin Blue Cube Germany and Infiana Germany, succeeded in optimizing rotor blade production for wind turbines, thereby providing the basis for considerably reducing their manufacturing costs. The cost-efficient production automation achieved, including increased quality assurance and improvements in health protection and ergonomics during production, will enable the expansion of wind turbines to be driven forward in the context of the Energy Concept 2050.

Consumer Goods

New orders for manufactured durable goods in November, up two of the last three months, increased \$15.1 billion or 5.4% to \$295.4 billion. This followed a 5.1% October decrease. Excluding transportation, new orders increased 0.5%. Excluding defense, new orders increased 6.5%. Transportation equipment, also up two of the last three months, led the increase, \$14.3 billion or 15.3% to \$107.8 billion.

Some of the highlights of November 2023 are as follows:

- **CompPair Healable Composites, Recycled Carbon Fibers Featured in ID Genève Luxury Watch.** The newly launched Circular C watch by ID Genève is claimed to be the first regenerative watch that has been designed with CompPair Technologies' (Renens) healable composite technology, HealTech, produced with prepregs made from recycled carbon fibers sourced from industrial waste. The dial, side decorations and bezel of the watch are all comprised of HealTech prepregs, which are capable of repairing scratches and internal cracks up to 400x faster than industrial standards. Initially intended for sports, leisure and aerospace components, CompPair's smart material has also proved its appeal in the luxury sector.
- **Lotus Launches Limited Edition Electrified E-bike.** Lotus, a global performance brand, has unveiled Type 136, a high-performance, track-inspired road bike model that is reported to feature the lightest E-bike motor from HPS weighing in at 300 grams to deliver dual-use functionality that enables riders to go further, faster and higher. Its design has been inspired by Lotus' success in global velodromes. Handmade in Italy, the lightweight carbon fiber frame and state-of-the-art components mean Type 136 weighs just 9.8 kilograms. It features V-shaped handlebars, wing-shaped forks and vaulted chain stays, helping it carve through the air with speed and efficiency.

Recent Development in Materials

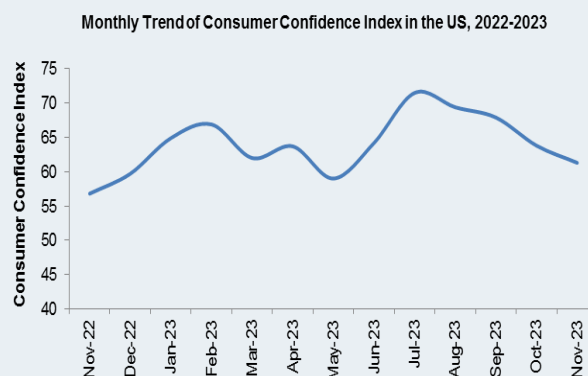
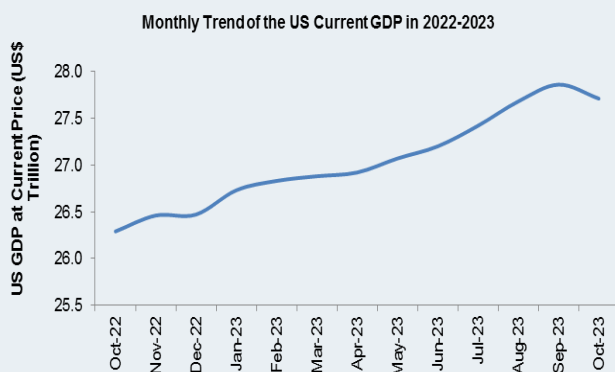
- Markforged Introduces Vega, an Ultra High Performance Material.** Markforged Holding Corporation launches Vega, an ultra-high performance filament designed for aerospace manufacturing on Markforged's FX20 printer. Vega not only offers exceptional strength but also is expected to bring customers substantial advantages in weight reduction, cost efficiency, and lead time savings. Vega is a carbon fiber-filled PEKK that can save weight, cost and lead time by replacing aluminum. Vega builds upon Markforged's material expertise and proven track record of engineering chopped carbon fiber-filled polymers that deliver strength, precision, and surface quality. Markforged developed Vega to be compatible with the FX20's Continuous Fiber Reinforcement technology to deliver aluminum-strength parts. The new material expands the utility of 3D printing with Continuous Fiber Reinforcement for aerospace manufacturing from aesthetic parts to non-critical structural parts in interiors and similar applications.

The US Economic Overview – November 2023

The US Consumer Confidence Index decreased to 61.3 in November 2023 as compared to 63.8 in October 2023. The GDP at current price of the US decreased from US \$27.86 trillion in September 2023 to US \$27.71 trillion in October 2023.

Real gross domestic product (GDP) increased at an annual rate of 4.9% in the third quarter of 2023, according to the "third" estimate. The increase in real GDP reflected increases in consumer spending, private inventory investment, exports, state and local government spending, federal government spending, residential fixed investment, and non-residential fixed investment. Imports increased.

The price index for gross domestic purchases increased 2.9% in the third quarter of 2023, a downward revision of 0.1% point from the previous estimate. The personal consumption expenditures (PCE) price index increased 2.6%, a downward revision of 0.2% point. Excluding food and energy prices, the PCE price index increased 2.0%, a downward revision of 0.3% point.



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