



FORD PERFORMANCE



Ford Performance and Carbon Revolution Offer Wide Range of Benefits Through Carbon Fiber Wheels

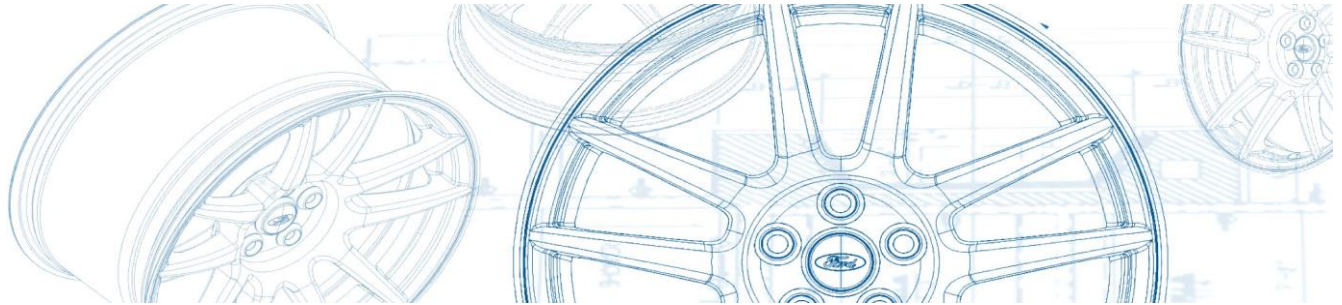
- Ford Performance and partner Carbon Revolution offer the first production OEM standard carbon fiber wheel on the Shelby® GT350R; now offer optional wheel for the all-new Ford GT
- Ford Performance and Carbon Revolution continue to work closely in development of the most innovative and advanced carbon fiber wheels
- Benefits of carbon fiber go well beyond weight savings in Ford Performance vehicle applications; improving performance in ride comfort and vehicle dynamics

The Ford GT to offer the most advanced carbon fiber wheel to date, featuring improved style and functionality over current lightweight wheels in the industry.

Ford Performance partnered with Carbon Revolution to benefit from their many years of experience with composite technology and decades of experience in Aerospace and Automotive design. The unique properties of carbon fiber – lightweight, high strength and stiff – provide a remarkable performance improvement in the case of both the Shelby GT350R and the all-new Ford GT. Utilizing cutting-edge computer modeling tools, composite structures are optimized to very precise specifications, ensuring the carbon fiber wheels improve performance in acceleration, braking, ride comfort, vehicle dynamics, and weight reduction.

- **Acceleration & Braking**
Less weight means less work, with lightweight wheels reducing the rotational inertia of the system, while generating improved acceleration and deceleration.
- **Comfort**
Carbon fiber wheels are significantly lighter, yet able to maintain equivalent or superior stiffness. The unique material properties of carbon fiber allow it to damp vibration, which reduces road noise and refines ride comfort.
- **Vehicle Unsprung Weight**
Carbon fiber wheels enhance the suspension's ability to maintain contact with the road surface, improving traction and driver control. Through a substantial reduction in wheel inertia, the steering feel and chassis response are also quicker and sharper, making the car more predictable and controllable.

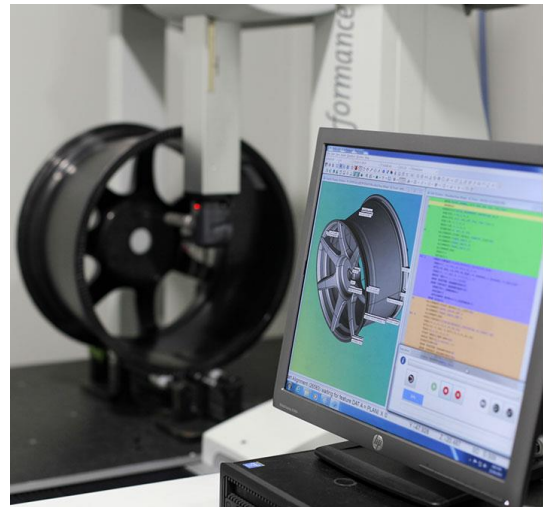




Development of an OEM carbon fiber wheel

Ford Performance and Carbon Revolution both utilize virtual product development. Carbon Revolution runs computer models able to simulate wheel durability and stiffness. Manufacturing options can be investigated, as well as analysis of weight and moments of inertia to forecast wheel performance for Ford Performance. Once the final design concept has been selected, the wheel is optimized through the use of Finite Element Analysis (FEA). This advanced tool, which is able to model each individual carbon ply, makes it possible to simulate demanding on-vehicle conditions: such as hard cornering or driving over a curb, while changing the carbon layup real-time to enable a fully optimized structure for the given wheel design. The ultimate goal is to get the design right the first time to accelerate the testing and validation process. This test is done before any physical parts have been created, saving time and money as prototyping and tooling is minimized, while the final product performs exactly as engineering intended.

- **Manufacturing**
Carbon Revolution utilizes a “smart factory” with a radio frequency identification (RFID) quality tracking system. Each wheel is fitted with a RFID chip allowing it to be tracked throughout the manufacturing process and service life. This process ensures 100% part tracking, identification and verification of all material batches, processes, operators, processing data and end-of-line testing.



- **Raw Material**
Carbon fiber has reshaped the world of aerospace and motorsports over the last decade, now it is being used to transform the automotive industry by improving vehicle efficiency, comfort and control.

130 **10**

13x STRONGER

Carbon Fiber's tensile strength, the ability to withstand longitudinal stress, is 13x stronger than Aluminum

1/10 DIAMETER OF HUMAN HAIR

Each individual carbon fiber is 1/10th the diameter of a human hair, yet has tremendous strength





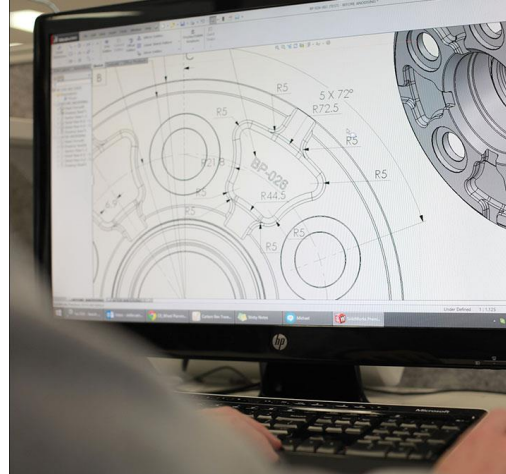
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Carbon Revolution employs a proprietary “dry fiber” manufacturing process, allowing full control of fiber placement and material properties. They are also using the next generation of carbon fiber materials to continue advancing their leading single-piece carbon fiber wheel technology.

- Fabrication

The proprietary and patented manufacturing process shapes and forms the carbon fiber into the complex internal structure of the wheel. Automated operations result in high-volume, precision fabrication of the carbon fiber preforms, which are then quality checked and prepared for resin infusion.



- Infusion

The preformed carbon fiber components get injected with resin and then a barrage of computer checks and measurements are made using state of the art instruments controlling temperatures, pressures, and hundreds of other processing parameters. The one-piece carbon fiber wheel is then released for final machining and additional quality checks.

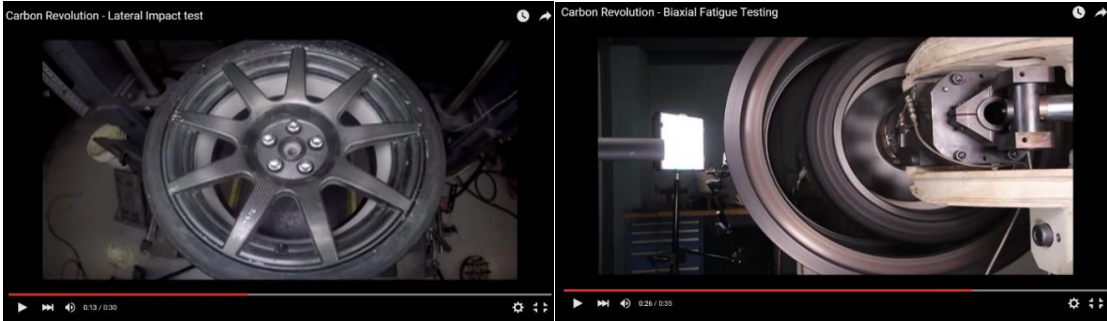
- Quality

Wheels ready for final inspection are put through a further 181 checks and measured at 2000 data points. Every wheel also completes a three-dimensional CT X-Ray scan and inspection after it is coated and prepared for shipping to the assembly location for Ford Performance. Every step in the quality process is tracked and logged by the RFID chip and is highly repeatable and controllable ensuring every wheel is set to the high OEM standards of Ford Performance.



- Testing

Carbon Revolution and Ford Performance subjects its carbon fiber composite wheels to the highest testing standards ensuring the wheels are strong and durable to last the life of the model they are designed for. Testing is focused in three general areas; impact testing, fatigue testing and vehicle testing.



Impact tests are designed to simulate impacts from potholes and curbs using a calibrated striker to verify the strength of the wheel design and quality of manufacturing. To ensure the one-piece carbon fiber wheels can go the distance a BIAX (bi-axial) testing fixture is used for simulating any type of driving conditions and prove out the wheels for hundreds of thousands of miles. While testing in laboratories has tremendous value in creating repeatable tests, real world testing is the ultimate validation. Ford Performance conducts extensive vehicle testing for potholes and curb strikes as well as durability testing to make sure the wheels meet OEM wheel standards.

The highlight of vehicle validation is the Ford Performance track durability procedure that aims to test the entire vehicle at its handling limit on a road course, and do so for a customer-correlated life of recreational track days. The carbon wheels must not only withstand this test, but show no degradation in dynamic performance at end of test. This testing goes above and beyond a typical passenger car validation, and aims to ensure that performance enthusiasts are receiving a highly capable vehicle that remains capable throughout its lifespan.

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