



**Plastic hybrid materials  
found throughout the Porsche  
Carrera GT make it light in  
weight and structurally strong**

**plastics  
&  
autos**

# Plastic hybrid materials found throughout the Porsche Carrera GT make it light in weight and structurally strong

- The Porsche Carrera GT chassis is composed primarily of plastic hybrid materials that help improve safety and body strength while allowing the vehicle to weigh only 3,043 lbs<sup>1,2</sup>
- In addition to the chassis (which includes the windshield frame and supplemental safety bar system), carbon fiber reinforced plastic (CFRP or carbon fiber) is used for the engine/transmission support frame, doors, hoods, fenders, underfloor tray, many interior components, and even the car's two roof panels. CFRP has thermal-resistant properties and is twice as strong as steel, yet five times lighter.<sup>3,4</sup>
- Unlike a conventional body structure made of numerous separate components, the Carrera GT's chassis, one of its main structural components, is composed of only a few shell elements bonded together in a high-pressure furnace to form a single structure that is exceptionally rigid and strong. Known as a "monocoque structure," it is made from CFRP with a honeycomb core.<sup>5,3,6</sup>
- The lightweight strength of the monocoque chassis provides passive safety to the Carrera's passengers, resulting from the elimination of the large number of welded joints that are generally a structure's weak points.<sup>5,7</sup>
- Using lightweight CFRP for the chassis has also increased the Carrera's torsional stiffness to the point that it is greater than that of the majority of modern coupes. Increased torsional stiffness improves handling, which in turn enhances the Carrera's active safety.<sup>8,9</sup>
- The Carrera GT's engine frame (or engine cradle) is also made of CFRP, resulting in a component that weighs 45 kg—less than half of what it would in metal—yet, is strong enough to support both the engine and gearbox and act as the car's chief structural member, along with the monocoque chassis<sup>10,11</sup>
- Using CFRP for the engine frame also offers the benefit of lightweighting through parts integration. A typical engine frame has more than 200 attachment points to accommodate the drivetrain and crash structures. Composite materials in the Carrera, however, eliminated the need for the heavy brackets that would have offset any possible weight savings. This was one of the reasons why Porsche ruled out aluminum for the frame design.<sup>10</sup>



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**The Porsche Carrera GT's plastic hybrid materials help strengthen the structural safety of the car while providing the benefits of lightweighting.\***

## Additional Information

- According to Walter Schauensteiner, team leader for the Carrera GT's interior body engineering, the use of CFP resulted in important weight and stiffness benefits that at the same time contributed to improvements in the car's torsional and flexural stiffness, which "enhances the driving dynamics."<sup>10</sup>
- The CFP engine frame is a first in production cars and won the SPE's Engineering Excellence Award.<sup>10</sup>
- The Carrera GT is the first road car built around a monocoque, composite chassis and also the first with an engine and transmission support made entirely of CFP.<sup>3</sup>
- The structure of the Carrera GT is similar to the carbon fiber monocoque design of Formula One racecars, which incorporate the cockpit and the driver's "survival cell," and also forms the principal component of the car's chassis, with the engine and front suspension mounted directly to it. "The fact that so many Formula One drivers have survived enormous accidents is a testament to the enormous strength of the survival cell."<sup>12</sup>



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**The Carrera GT's CFRP monocoque chassis is designed for structural strength.\***



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**The lightweight Porsche Carrera GT, with its racecar looks and performance, was initially intended to compete in the 24 Hours of LeMans car race.<sup>13</sup>**



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Photo Courtesy of SPE Automotive Division.

**The engine frame is also made entirely of CFRP, allowing it to weigh less than half of what it would if it were made out of metal.\***

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## Pictures

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