



## Carbon Exterior Parts Audi RS 6 GT

CAC and Audi Sport Developed the Carbon Prepreg Front End in Body Color for the Audi RS 6 GT

## Painted Carbon Prepreg Front End for the Audi RS 6 GT

COBRA Advanced Composites (CAC) has delivered strong, light and beautiful serial production carbon fibre prepreg parts to Audi for more than 18 years. Consistently developing its supplier partnership, CAC has evolved, moving from aesthetic, clear-coated carbon fiber components to fully structural, crashworthy, and body-colored carbon fibre parts. CAC's strong internal expertise in carbon prepreg technology, combined with extensive design management and a trusted network of external partners, has enabled the creation of high-performance front fenders and bonnet for Audi's limited-production RS 6 GT.

## Lighter, Faster and more dynamic

The Audi RS 6 GT features a very potent and powerful V8 twin-turbo engine, delivering the best acceleration performance of the RS 6 range. The car uses carbon fibre for its ability to meet both functional and aesthetic requirements, reducing vehicle weight and integrating key design features like aerodynamic ducts in the bonnet and front fenders whilst also enhancing the car's visual identity. The materials and classic Audi Tradition coloured foil design also provided an important link to Audi's racing heritage, echoing the unique look and exceptional performance of the epic Audi GTO from the North American IMSA Series in 1989.

Pictured alongside the IMSA Audi GTO, the striking design of the limited-edition RS 6 GT perfectly aligns with the vehicle's premium range-topping position and links perfectly with the all-wheel-drive, carbon shelled car that scorched a turbocharged path across the American racing scene.



## Fully structural, highly visual, crashworthy components

Audi set its suppliers a significant challenge for the RS 6 GT, with CAC securing the all-carbon front end package nomination in November 2021 only 3 months after discussions on the project began. Not only were the parts to include multi-zone visual-carbon and painted areas, but they also needed to meet pedestrian safety aspects, such as controlled deformation under impact.

CAC took the outer design CAD that was provided by Audi and then defined the initial composite plybook before engineering the inner structure of each panel to meet the safety and visual requirements. This first-pass composite design was then jointly evaluated by Audi R&D and CAC, who used computer aided engineering (CAE) and finite element analysis (FEA) tools combined with pre-approved materials from the Audi and VW Group and validated bonding and assembly processes to begin the simulation of various crash scenarios.

Fortunately, CAC's plybook expertise delivered an excellent fit with the expected panel deformations and fold line calculations, delivering positive news from Audi R&D after simulated crash testing. This key project milestone allowed the CAC team to move forwards, concentrating on tooling, production and surface quality requirements.



## Optimised carbon fibre production focused on surface finish

With dimensions, materials, bonding and assembly processes now agreed, CAC could coordinate the production of aluminium master moulds for the major parts, with additional high-Tg CFRP lamination tools being produced in house for the outer and inner shells.

Precision cut lay-up kits of surfacing film and woven, twill weave, carbon fibre prepreg were created on CAC's Zünd CNC plotters, ensuring consistent quality and traceability for the fenders and bonnet.

Fenders were produced in a multi-stage process with debulking being systematically applied during lamination, and a surfacing film used for body colour areas. Inner ducts were manufactured separately and finished in visual carbon fibre with satin lacquer. The bonnet was produced using two moulds, with the inner and outer panels cured separately in the autoclave and bonded afterwards.

CAC uses a combination of vacuum clamped trimming jigs and carbon fibre post-trimming measurement frames to ensure parts are dimensionally perfect and ready for paint. The priming stages were completed in Thailand, with the inner surface being clear-primed before bonding. Surface preparation included cleaning and masking specific areas to optimise bonding and painting. The inner and outer fender panels were bonded in jigs, with an adhesive system that was validated through extensive testing to meet the structural and visual targets, followed by further dimension checks and inspections to ensure quality.

The inner bonnet skin had mounting hardware attached before it was bonded to the outer bonnet shell. This interior surface of the bonnet was entirely finished at CAC with a thermally stable visual carbon satin finish being applied that could resist the heat generated by the RS 6 GT engine. After bonding, the outer surface was prepared with an epoxy primer in body colour areas and clear primer for the visual carbon sections. Masking ensured precise transitions, with all surfaces undergoing sanding at each stage of the process.

Primed RS 6 GT parts were shipped by air from CAC Thailand to a specialist painter in Germany where the body coloured paint system was applied, then moved to the CAC Europe warehouse, before being collected by Audi for installation. CAC production of the carbon parts for this program is expected to finish in mid-2025.



## Setting the stage for the future of lightweight structural automotive composites.

The RS 6 GT program at CAC builds on previous experiences, integrating lessons learned to refine processes and optimise overall manufacturing. CAC is very proud of the components produced and enjoyed the extra control over key elements such as the composite plybook strategy and the paint system supplier selection. Together, the CAC team and its network have successfully delivered a more cohesive solution that perfectly matches Audi's requirements. For a limited production run of 660 cars, tailored carbon prepreg manufacturing provides an efficient way to achieve the design complexity and exclusivity demanded.



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