



## Case study: Zenos E10 Chassis

Bright Lite Structures specifies Hexcel carbon multiaxials for safety-critical application in the award-winning Zenos E10 chassis

Hexcel's HiMax™ reinforcements have been selected by Bright Lite Structures for the manufacture of safety-critical areas of the Zenos E10 composite chassis. The carbon fibre multiaxial fabrics ensure that the sports car's floor structure can withstand seat belt pull-out loads in the event of a crash.

### A fresh approach

British company Zenos Cars was established with the aim of developing a high performance sports car with low ownership costs, making an exhilarating driving experience accessible to larger numbers of people. The lightweight, innovative composite construction of the cars delivers exceptional performance and driver experience on both road and track at purchase prices starting from just £27,000.

Zenos started production of its first car, the E10, in January 2015. Equipped with a mid-mounted 200 bhp 2-litre engine, the E10 accelerates from 0-60 mph in just 4.5 seconds and boasts a top speed of 135 mph.

The Zenos E10 chassis was designed and developed by Bright Lite Structures, which has patented a unique, low cost manufacturing technology for carbon composite components. The company's design philosophy was to make the chassis as simple,

attractive and low cost as possible, whilst maintaining its high functionality by maximising parts consolidation and integrating assembly features. Unlike other vehicles, the chassis is not hidden beneath body panels, which reduces part count and cost. Parts are designed to 'clip' together tongue-and-groove style, prior to adhesive bonding, resulting in lower assembly costs.

The chassis is made up of five parts – front and rear bulkheads, floor pan and left and right body side panels – bonded to a central aluminium spine. The composite parts are manufactured as a sandwich structure with a core material made from hollow tubes of recycled polycarbonate. The laminate either side of this core uses a single ply of recycled chopped carbon fibre in the form of a multiaxial mat, and a resin blend of polyurethane and RTM-grade epoxy.

For the 1.6 m x 1.7 m chassis floor, two carbon fibre multiaxial reinforcements produced by Hexcel Reinforcements UK (formerly FORMAX) are also specified. Should the vehicle be involved in a crash, these reinforcements are engineered to spread the seat belt pull-out load over the largest possible area, ensuring the metal seat belt inserts positioned under the floor remain in place.



The chassis comprises five carbon composite parts bonded to a central aluminium spine. Hexcel's HiMax™ fabrics play an integral role in reinforcing areas of the floor.

## The right combination

Antony Dodworth, Bright Lite Structures' Chief Technology & Manufacturing Officer, has collaborated successfully with Hexcel Reinforcements UK on a number of projects and contacted the company for guidance during the E10 chassis design phase. After studying the requirements for the additional reinforcement of the chassis floor, Hexcel recommended a combination of two multiaxial fabrics which would provide optimal performance for this challenging application.

On the floor interior, on top of the recycled carbon mat, one ply of HiMax™ 300 g/m<sup>2</sup> (75 g/m<sup>2</sup>, 150 g/m<sup>2</sup>, 75 g/m<sup>2</sup>) carbon fibre triaxial is added over the complete surface of the part. Additionally, one ply of HiMax™ 0/90° 300 g/m<sup>2</sup> carbon fibre biaxial is used in the areas of the seat belt inserts and seat mounting inserts, which are co-moulded into the floor.

## Award winner

The E10 chassis won Bright Lite Structures the 2015 Materials Innovation category of the 'Most Innovative Composites Part' Award at the Society of Plastics Engineers (SPE) Automotive Composites Conference & Exhibition (ACCE). The company has so far manufactured several hundred chassis sets with more planned.

Antony Dodworth, who has previously held design and engineering positions at McLaren, Bentley and Hyundai, sees Hexcel as a trusted and innovative supplier.

"I've worked with Hexcel Reinforcements UK since their inception," he notes. "They offer a personalised 'can do' attitude and are always able to advise in product development. They deliver the right product, offer great service, and the quality of the parts produced meet all our expectations and more."

Two new Zenos models are currently on the drawing board. The E11 cabriolet and E12 coupé will be more 'road-friendly' models designed to appeal to a wider market. The chassis design is expected to be similar to the E10.

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