

Lighter, more efficient, faster Evonik's lightweight design (LWD) Exige

The Evonik LWD Exige bundles innovative materials and systems integration of automotive Tier 2 supplier Evonik Industries in the areas of light weight design, fuel savings and emission reduction.

The aim of this innovation project was to demonstrate a potential curb weight reduction by using available technologies based on sandwich composites, high-performance polymers and PMMA for glazing. The Evonik project team selected promising material technologies based on properties, manufacturing processes and cost. Several solutions, first successfully applied and tested in motor sport, were enhanced to suit serial applications for LWD cars.

Lotus Engineering was selected as development partner because of its world-renowned competences in the design and manufacture of lightweight sport cars at reasonable costs. Thanks to all their experiences and competences in composite engineering, Lotus Engineering managed to complete design, tooling and production in just five months.

Details of the Evonik LWD Exige

- Chassis, body design and basis dimensions are based on the Exige S, model year 2009.
- Powertrain, suspension, wheels and equipment are based on the Exige Cup 260, as these components also are weight reduced.
- The body panels use ROHACELL®, a rigid foam core material sandwiched between thin pre-impregnated carbon fiber epoxy skins. This design provides significant weight reduction and excellent bending stiffness compared to common used glass or carbon fiber polyester design.
- Further weight reduction was achieved by applying side windows made from multi-layer PLEXIGLAS®. Here an elastomeric film was fitted between two PLEXIGLAS® layers to achieve extreme reliability as well as high optical quality at a low weight.



- Furthermore, charge air ducts between compressor, intercooler and engine inlet manifold were used replacing heavy sand cast aluminum parts by glass fiber reinforced PPA (VESTAMID® HT *plus*) and sintered PA 12 powders.
- As a next step, weight reduced Aspire tires with ULTRASIL® silicas and silanes like Si 69® and Si 363® for improved rolling resistance, wet handling and wet braking were tested and implemented.

The Evonik LWD Exige is the first authorized street car using these technologies.

Preliminary results

Lightweight Exige	
Curb weight	861 kg
Power	260 HP
Acceleration (0-100 km/h)	4.0 s
Fuel consumption	8.5 l/100km
CO ₂ emission	199 g/km

*) weight reduction and improved tires were not measured and considered.

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