Why develop a carbon wheel?

Project team

Project target

BUILDING ON PREVIOUS EXPERIENCE

THE POWER OF THE PROJECT TEAM
Why develop a carbon wheel?

Carbon wheels benefit from a formidable stiffness to weight ratio. It’s well known from the experience how stiff a carbon frame could be and carbon wheels are typically designed and engineered to be very stiff. At the same time, carbon wheel sets can allow a smooth and compliant ride as well so they can easily outperform aluminium in this field.

Low weight, superior aerodynamics and stiffness to weight ratio, hence lower fuel consumptions, are paramount aspects for performances, as well as when the weight reduction of the car is one of the key factor to comply with country regulations on CO₂ emissions.

In the motorsport world, the lighter the wheel, the faster the car.

Lighter wheels are also an advantage in standard cars, helping to reduce fuel consumption and improving the handling of the vehicle.

Project team

The partners were chosen based on their long-standing experience in material development and the automotive sector. The combination of their know-how is the key to success in this complex project.

- Wheel design regulations, structure specifications and FMEA
- Design and simulation of advanced composite materials
- Manufacturing of advanced composite materials
- Tooling for high productivity of advanced materials and composites
- Process modelling and simulation (RTM, HP-RTM...)
- Material selection: simulation and characterisation of mechanical and chemical properties (thermal aging, moisture aging...)
- Structural health monitoring for composite materials
- Wheel test/homologation know-how and available equipment for multiple trials.

Kick off meeting in Mils, Tirol, Austria 13/14 January 2016
A WORLD OF APPLICATIONS

Wheel design regulations, structure specifications and FMEA

Composite materials and design

OEM
Wheel design regulations, structure specifications and FMEA

Material qualification

Wheel testing

Fraunhofer ICT
Technology development

ALPEx
Tooling
Project target

To develop a carbon composite wheel that is lighter than an aluminium-forged wheel and that can be produced with automated technology according to OEM specifications.

<table>
<thead>
<tr>
<th>Target weight</th>
<th>-30%</th>
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</thead>
<tbody>
<tr>
<td>Production rate (first step)</td>
<td>20,000 per year</td>
</tr>
<tr>
<td>Style / Application</td>
<td>OEM partner requirements</td>
</tr>
<tr>
<td>Timing</td>
<td>24 months</td>
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</tbody>
</table>

BUILDING ON PREVIOUS EXPERIENCE

- A composite wheel has already been designed and tested with TUV criteria
- Hub / spokes connection solution developed
- Rim fibre continuity
- Modal shapes and frequency as the key for car handling
- Corrosion and creep: the aging is a key parameter in the selection of the curing cycle and matrix material. The partners have developed a strategy to manage this.

THE POWER OF THE PARTNERSHIP

- Interdisciplinary know-how at top level & experience shared between partners
- Technology will lead the design
- Material building block approach
- Logistically easy for the partners and the European OEMs.

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