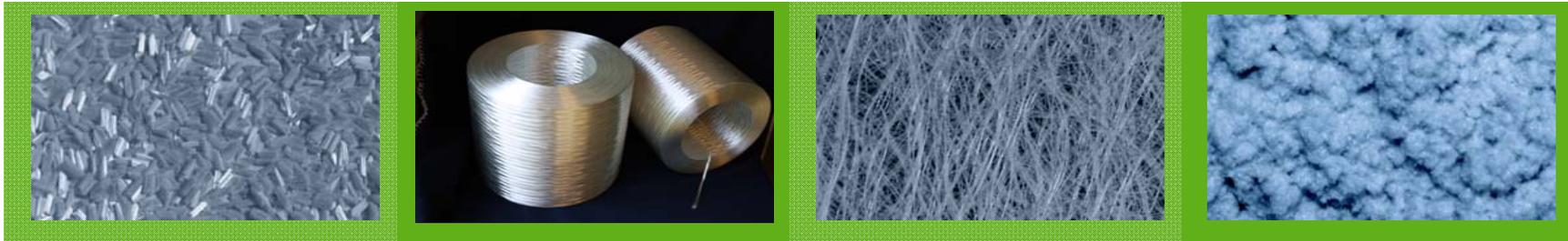


**discover your fibreglass world**

**light & sustainable with fibreglass**



- ❑ **Leading developer and supplier of fibreglass products and technologies for the Composites industry**
- ❑ **45 years of experience**
- ❑ **140 000 tons of glass produced per year**
  - **More than 50% going into the Automotive industry**
- ❑ **Chopped & Continuous fibres for THERMOPLASTICS**
  - **#1 in Europe (20% market share in 2010)**
- ❑ **Continuous fibres for THERMOSETS**



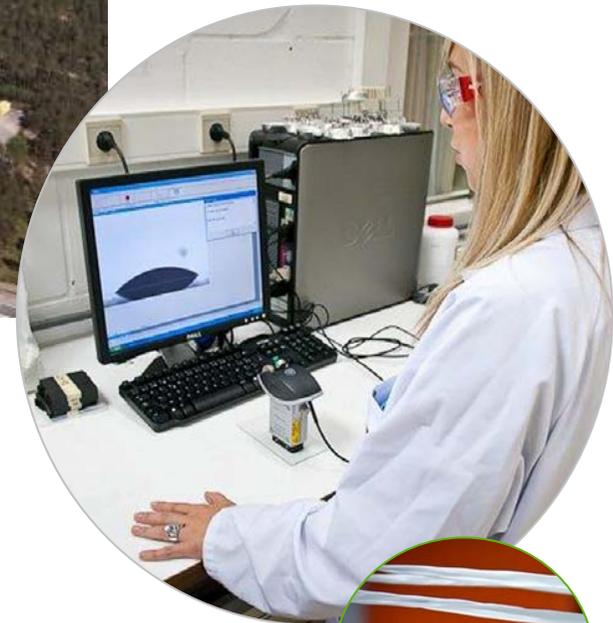
□ **Sales Offices**

- Europe
- USA
- India
- China



□ **Productions**

- Norway
- Belgium



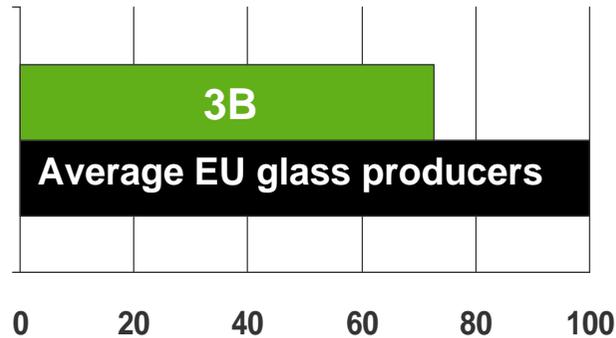
□ **Research & Application Development**

- Belgium (Lüttich, 25 km from Aachen)
- Activities in Glass – Fibre coating – Composite

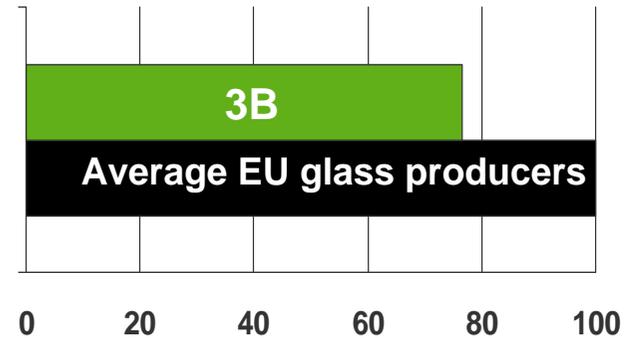


□ 3B, a reference in controlling:

➤ Energy consumption



➤ Greenhouse gas emissions



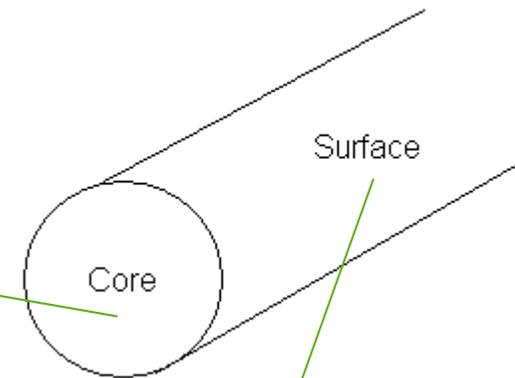
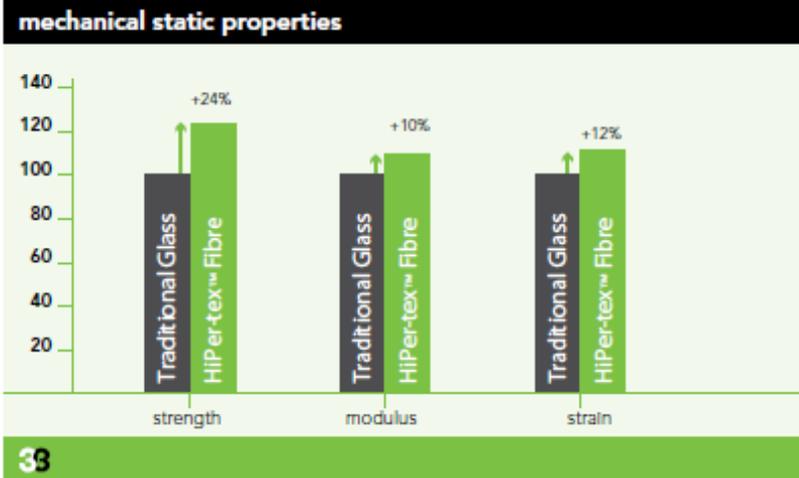
□ The 2 Cleanest glass formulations

- No added fluorine
- No added boron

Advantex®



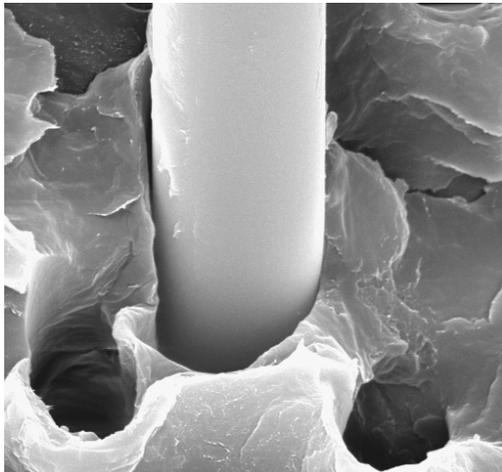
## Glass composition



## Glass fibre coating

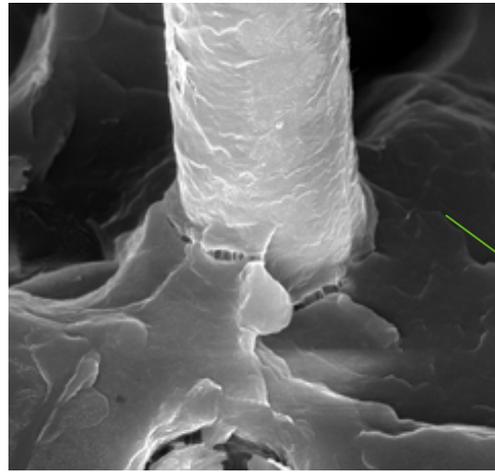
- Engineered Glass-Polymer interphase
- Plastic resin dependant - Chemical bonding
- Optimized load transfer

□ Glass fibre coating



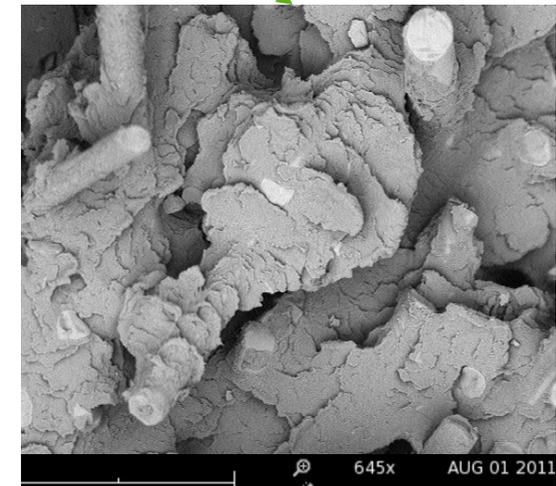
**Poor coating**

Debonding (Pull-out)



**Good coating**

Cohesive adhesion



PA66 - 50%wt GF	Poor coating	Good coating
Tensile strength (MPa)	50	180
Notched Impact Strength (kJ/m <sup>2</sup> )	< 5	18

> 250% performances gain

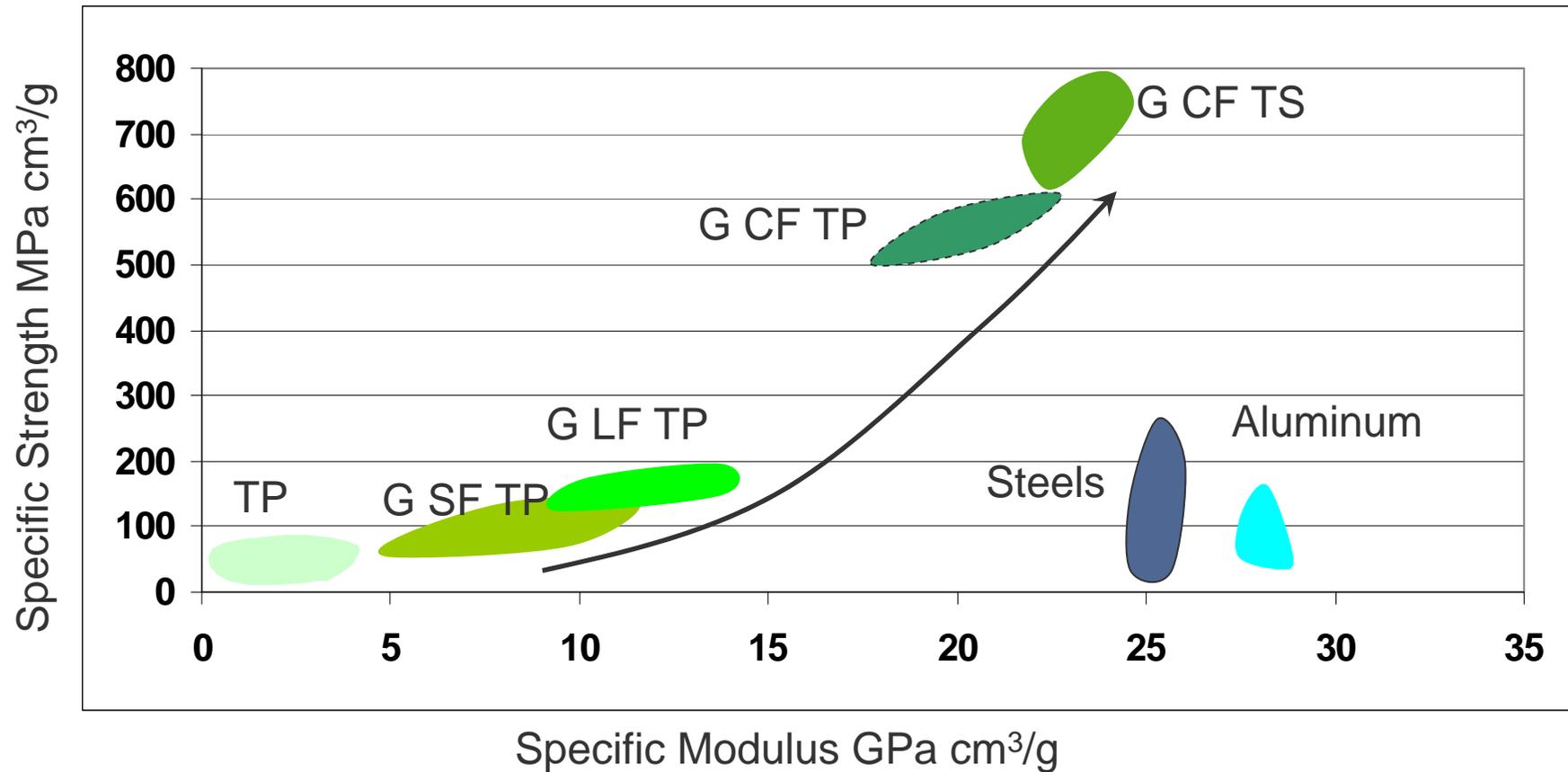
## European regulations\* objective

- ❑ Progressive reduction of CO<sub>2</sub> emissions of new cars hitting the road in Europe

Leading to OEMs' challenges of **light weight** and fuel consumption efficiency, without compromising:

- ❑ Safety
- ❑ System Cost
- ❑ Driving performances
- ❑ Sustainability
- ❑ Design freedom

\* EC n°443/2009 & EC n°510/2011



- ❑ Versatility
- ❑ Attractive Cost / Performance ratio
- ❑ Ideal for the development of sustainable thermoplastic composites

# Innovative light & safe leaf springs

**Advantex<sup>®</sup>**  
epoxy  
thermoset



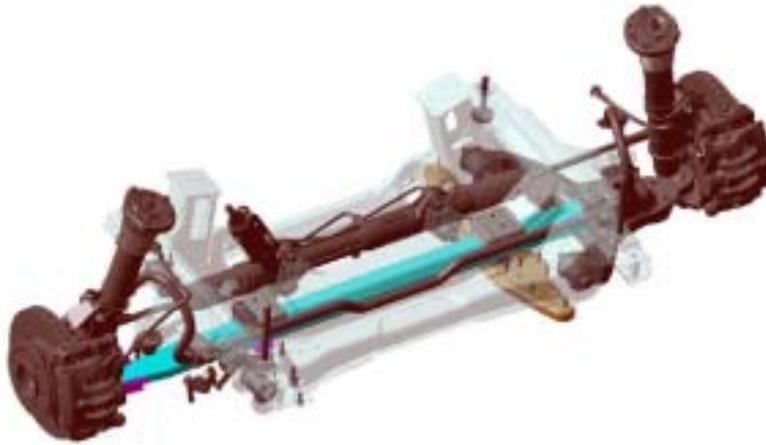
- ❑ Leaf spring prototype
- ❑ Designed for 40 ton truck
- ❑ Independent front wheel
- ❑ 80% lighter than steel

**Advantex<sup>®</sup>**

- ❑ Corrosion resistance
- ❑ Stiffness for damping
- ❑ Constant properties at low T°



- **CO<sub>2</sub> emission reduction: - 10 gr /km per 100 kg saved\***



**- 21 kg vs steel**

**- 2 gr CO<sub>2</sub> / km**

\* Source: VDI Wissensforum GmbH, 2011

# Innovative light & safe CNG cylinder

Carbon  
&  
Advantex®  
epoxy  
thermoset



Manufacturer: XPerion (Germany)



- ❑ ECE R110 Certified
- ❑ 0,47 kg/l
- ❑ 60% lighter than steel

**Advantex® (85%)**

- ❑ Corrosion Resistance
- ❑ Impact Resistance
- ❑ Strength

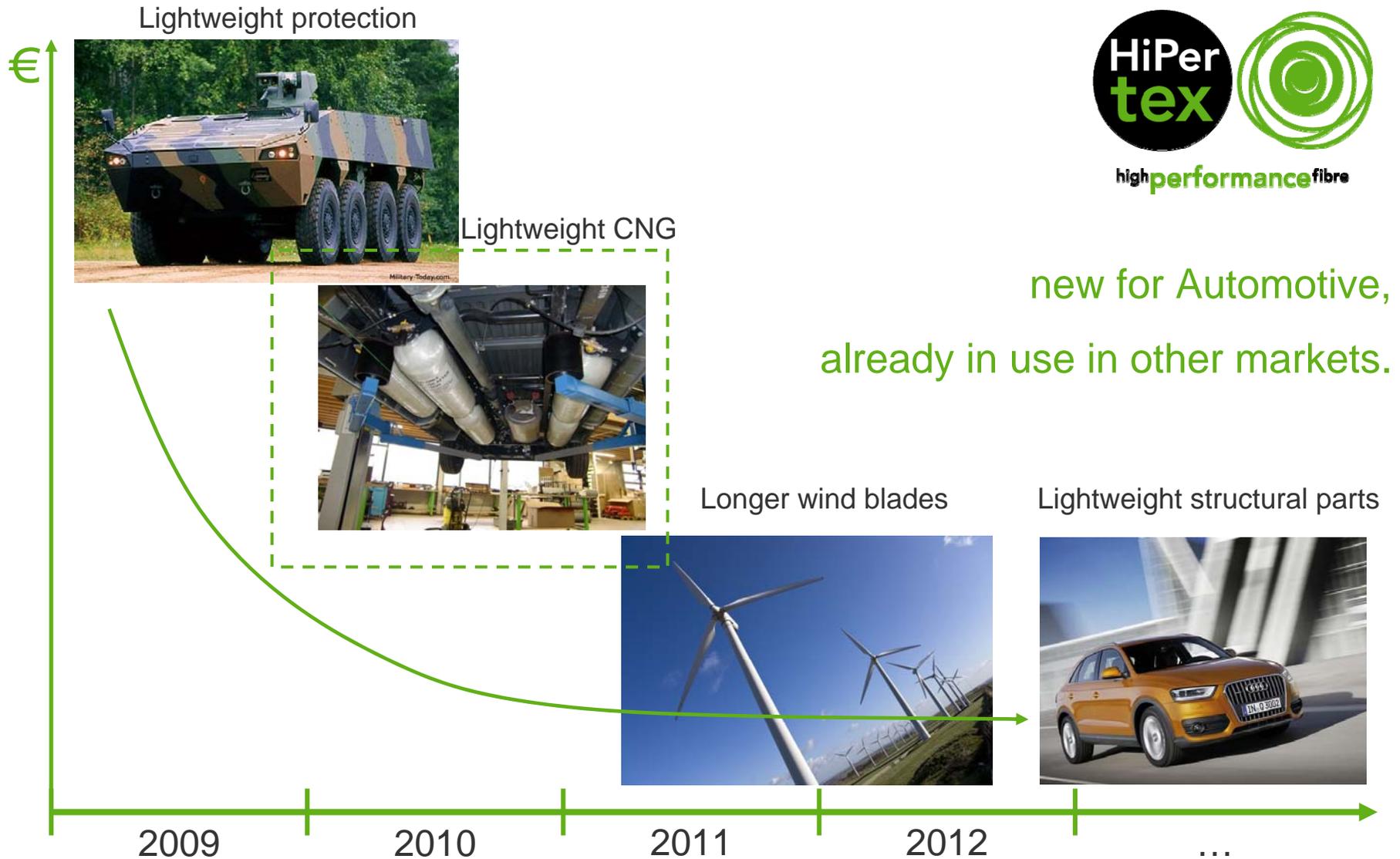


- ❑ + 17% Stiffness
- ❑ Up to 30% Strength
- ❑ Up to 10x Fatigue
- ❑ Corrosion Resistant
- ❑ Impact Resistant

- ❑ Continuous roving
- ❑ Adaptable compatibility to matrix

- ❑ Clean glass formulation
- ❑ Large capacity platform

# Innovative High Performance Glass



# Innovative light & safe CNG cylinder

HiPer-tex™  
epoxy  
thermoset



**G** GASTANK



- ❑ ECE R110 Certified
- ❑ 0,53 kg/l
- ❑ 55% lighter than steel



- ❑ Up to 30% Strength
- ❑ Up to 17% Stiffness
- ❑ Up to 10x Fatigue
- ❑ Corrosion Resistant
- ❑ Impact Resistant

- **CO<sub>2</sub> emission reduction: - 10 gr /km per 100 kg saved\***

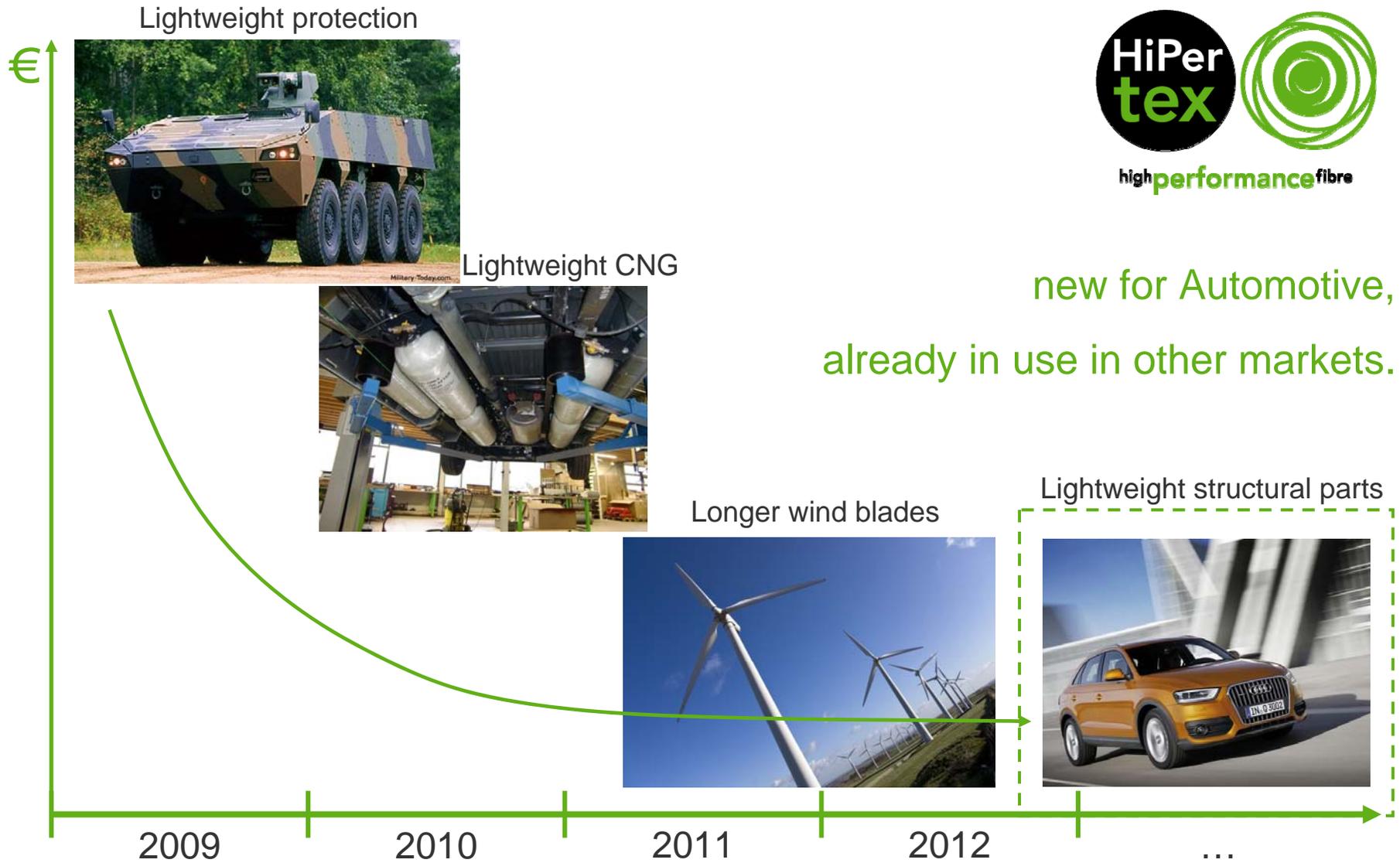


- 10 gr CO<sub>2</sub> / km on top of the 20% emission reduction provided by gas



- 6 gr CO<sub>2</sub> / km on top of the 20% emission reduction provided by gas

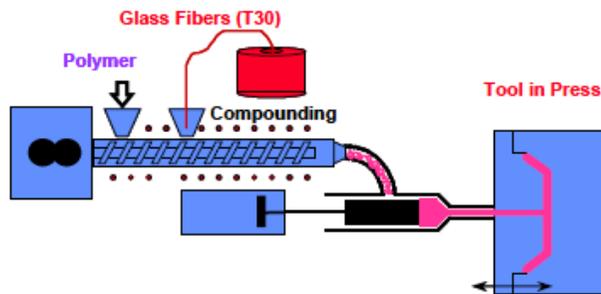
# Innovative High Performance Glass



new for Automotive,  
already in use in other markets.

# Innovative semi-structural parts

- ❑ LFT - Strong 3-D entangled glass fibre skeleton
- ❑ Optimal interface from -50°C to 200°C
- ❑ Low odour & VOC emissions grades



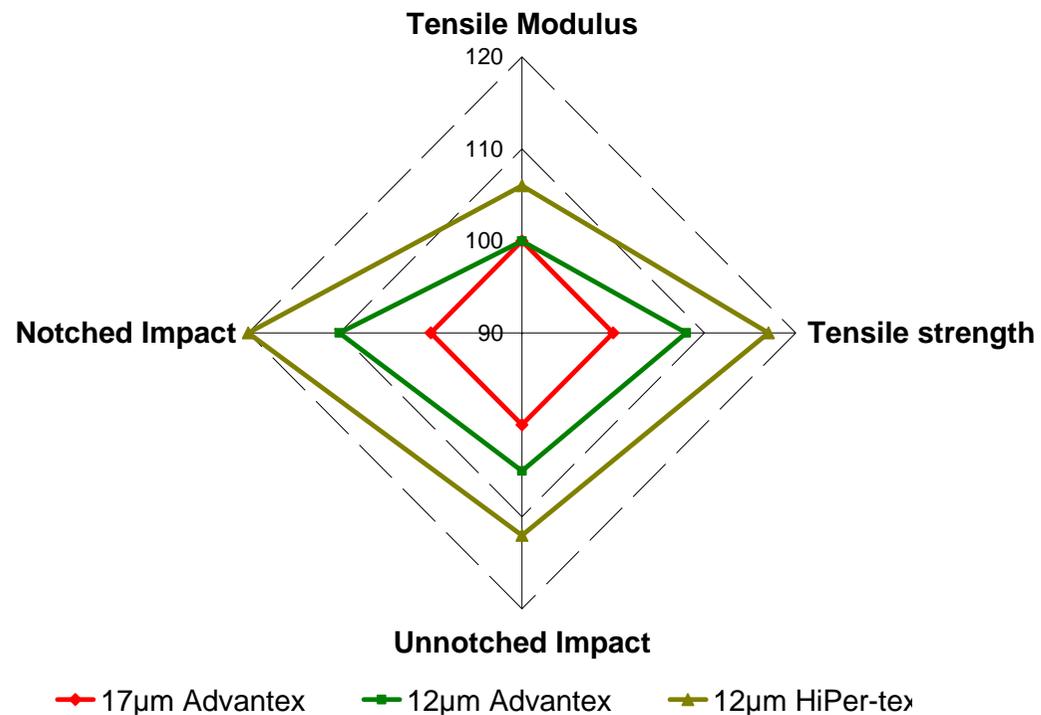
Courtesy of PlastiComp LCC



Courtesy of Faurecia

- Cost effective
- Stiffness – toughness balance
- High energy-absorption over a wide T range
- Very low warpage
- Fatigue resistance

- ❑ New lightweight opportunities through combination of HiPer-tex™ glass, engineered interface and fibre aspect ratio
- ❑ Metal replacement
  - Engine brackets
  - Crash absorbers



# Innovative light structural parts

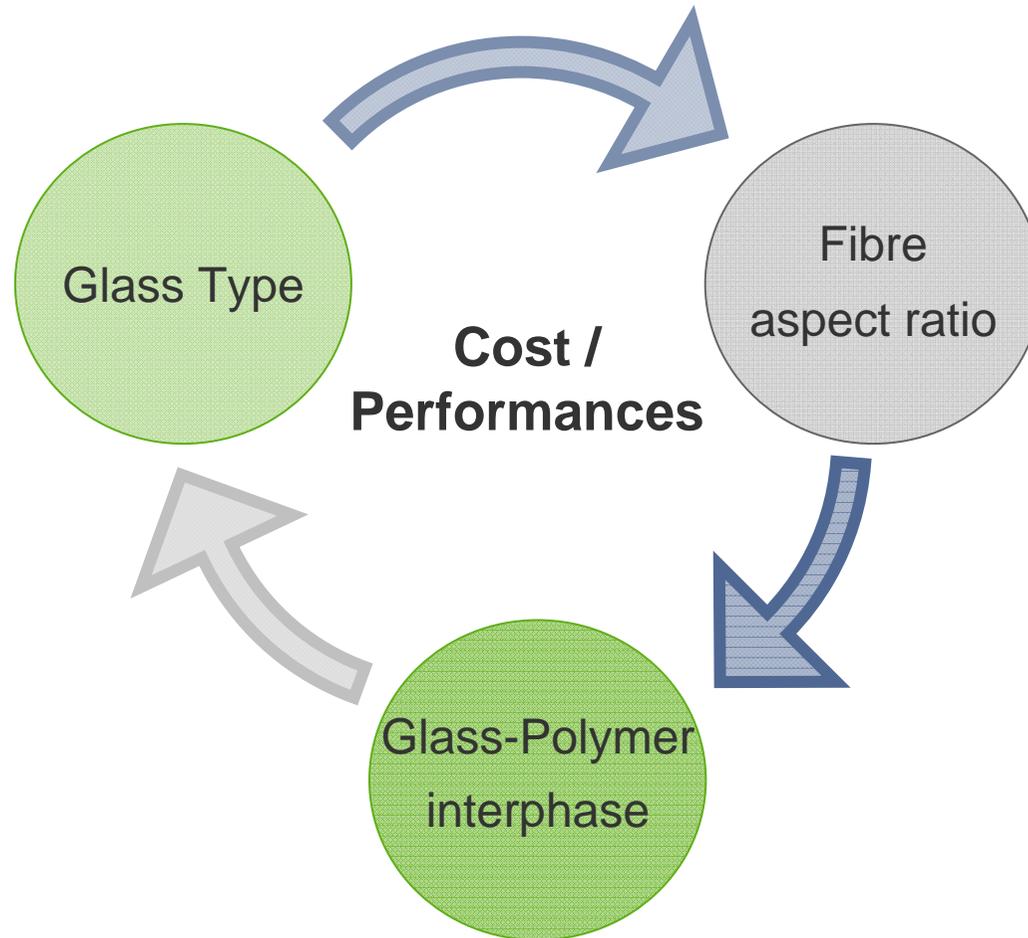
- ❑ Continuous glass fibre – PA,PP, PPS
- ❑ Optimal formability and energy absorption
- ❑ Corrosion resistance



- Mass series
- High specific stiffness
- Design freedom for complex architecture
- Outstanding crash resistance



Door chock absorber - Courtesy of Saertex GmbH



Short fibres  
Long fibres  
Continuous fibres

Thermosets

Thermoplastics