



## SAFER SUCCESS STORY: Fibre reinforced polymer composites in automotive applications

*“We need to develop accurate and efficient CAE tools for structural polymer composites, to help meet future emission requirements by reducing weight.”*

*Kaj Fredin, Manager Strategy,  
Concepts and Advanced Engineering,  
Volvo Car Corporation*

- SAFER initiated significant progress within the area, exemplified by formation of Chalmers Composite Cluster and growth of PhD students
- Important role in current European projects on crashworthiness of composite structures
- Contributed to establishment of LIGHTer

Transportation road vehicles need to significantly reduce emissions of greenhouse gases, whereby weight reduction is a key. As a consequence, increased usage of fibre reinforced polymer composites, which have high stiffness, strength and energy absorption capabilities per kilogram material, is of highest priority. A crucial enabler for the introduction of these materials is however an increased capability to, by numerical simulation, predict the material response in a crash.

### Benefit to the project partners and impact on society:

- A strong national consortium with 10 partners from industry, institutes and academia (out of which 7 are SAFER partners) collaborating on crash modelling of composites.
- Partner involvement in all five European SEAM cluster projects related to vehicle safety, lightweighting and composite materials.
- Formation of Chalmers Composite Cluster, a joint initiative between Chalmers and Swerea SICOMP involving industry partners such as Volvo Car Corporation and GKN Aerospace.
- Strong link between SAFER and LIGHTer (the national Strategic Innovation Area on lightweight).
- An increase from zero to seven PhD student projects in the period 2009-2015. Resulting in Europe's largest training effort of doctoral students for the modelling of energy absorption in composite crash structures.
- New materials for increased safety, e.g. a composite that can reduce its stiffness by 90% in a few microseconds and thereby provide increased pedestrian protection.

### The approach:

A significant journey starting with the SAFER pre-study “CAE Tools for composite body concept assessment” conducted in 2010 has been achieved. A direct outcome of the focused work on developing the area is the Chalmers Composite Cluster, a strong formation jointly driven by Chalmers and Swerea SICOMP with active contribution from industry. The current research portfolio comprises five national PhD projects on modelling and characterization of composite materials for automotive applications, the majority focusing crashworthiness. On top of this, SAFER researchers are active in four European Projects related to vehicle safety and composite materials. The ultimate goal of these efforts in a ten years perspective is to establish confidence in crash predictions of composite vehicles to a level comparable with current state of the art for conventional metallic structures.

### Measurable results:

- 1 Ph.D., 1 post-doc
- 1 new full Professor in Lightweight Materials and Structures
- 1 open seminar series on composites in the automotive industry (3 seminars during 2010)
- Numerous publications and presentations

**Funding: 4,3 MSEK SAFER internal (cash and inkind), and more than 33 MSEK external**

**Partners: AB Volvo, Autoliv, Chalmers, Swerea SICOMP, Volvo Cars, ÅF. (Semcon, DYNAMore Nordic, Escenda, Altair Engineering – non SAFER partners)**

**Funders: FFI, EU, Energimyndigheten, Chalmers (SOT)**

**Period: 2009-2016**