

The Monocoque

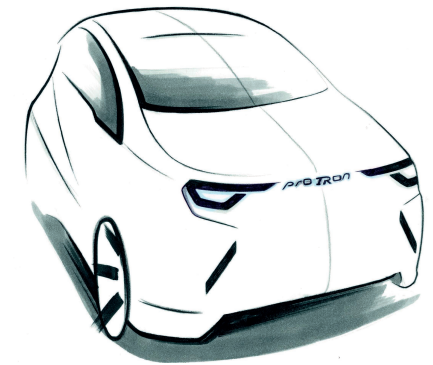
... is the innovative focus of the proTRon EVOLUTION. This integral lightweight structure is the heart of the passive vehicle safety. For the first time, a fiber composite monocoque is produced of natural fiber reinforced plastics. Carbon fiber, which is very energy-intensive in production, is only used in the highly stressed front crash absorbers.

Due to its shape, the monocoque achieves a maximum stiffness and strength with a minimum use of material. It builds the interface to all other components of the safety concept and helps to pass all the requirements of the UN-ECE regulations in the case of a crash.

The challenge is to fulfill every single requirement related to safety and driving dynamics and still realize the minimum weight limit.

The Interdisciplinary Team

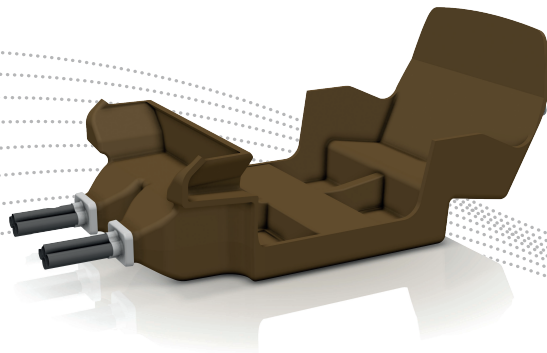
... consists of approximately 70 students from automotive engineering, mechanical engineering, electrical engineering, informatics, business administration and design. The students are responsible for the project management and organization, as well as the development work. The team is supported by professors of the different disciplines.



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The proTRon EVOLUTION
A concept for a highly efficient urban vehicle

Trier University
of Applied Sciences

H O C H
S C H U L E
T R I E R

The proTRon EVOLUTION

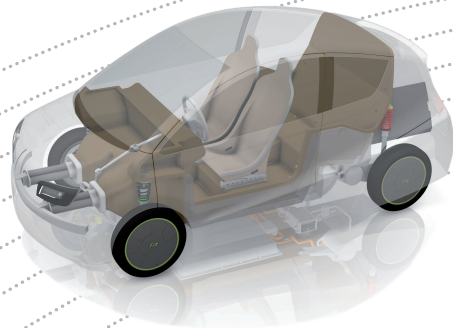
... is a highly efficient urban vehicle with the full everyday practicality:

- Designed for the commuting traffic and short overland routes
- Battery powered power train
- 2 + 2 seats
- 100 km range
- 100 km/h top speed

The high efficiency of the vehicle is achieved by a consequent lightweight design with a weight of 550 kg including the accumulator. Because of the innovative safety concept, the approval of class M1 (StVZO = Straßenverkehrszulassungsordnung, engl. German Road Vehicle Registration Regulation) is possible.

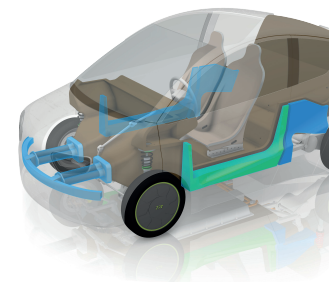
The drive concept of the vehicle offers space for the installation of an optional comfort module for extended reach, for example with means of a fuel cell. The result is an improved reach of at least 200 km as well as an increased climate comfort.

The proTRon EVOLUTION will be developed as a vehicle suitable for series production and manufactured as prototype at the Trier University of Applied Science.



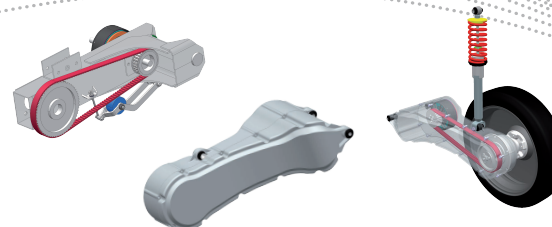
The Safety Concept

... solves the conflict between the low vehicle mass and the high body stiffness. The proTRon EVOLUTION belongs to the segment of mini cars, which means that there is little room for the conversion of kinetic energy into deformation energy in case of an accident. Only new materials and kinds of energy conversion as the crushing of fiber composite structures together with optimized restraint systems allow for a safe occupant deceleration in an accident. The proTRon EVOLUTION complies to all ECE-requirements



The Drive Train

... is optimally integrated into the vehicle package. The new concept of the drive integrated in the swing arms incorporates the lightweight 3.5 kg 8 kW engines, the planetary gear and the power transmission elements. The wheel-individual drive of the rear axle allows for torque vectoring. At the same time, there is unobstructed space between the wheels for the „comfort module“ and the luggage compartment.



The Design Cooperation

... with the students of Industrial Design at Osnabrück University of Applied Sciences exists since 2014. The design of the proTRon EVOLUTION was developed and implemented in common workshops.

The Test Vehicle

... has a versatile and cost-efficient structure of the same vehicle dynamics as the monocoque. The effect of the dynamic behavior of the chassis design and the torque vectoring on the driving and braking behavior can be tested. The aim of the development is a chassis, which offers a high driving safety for the given vehicle weight.

