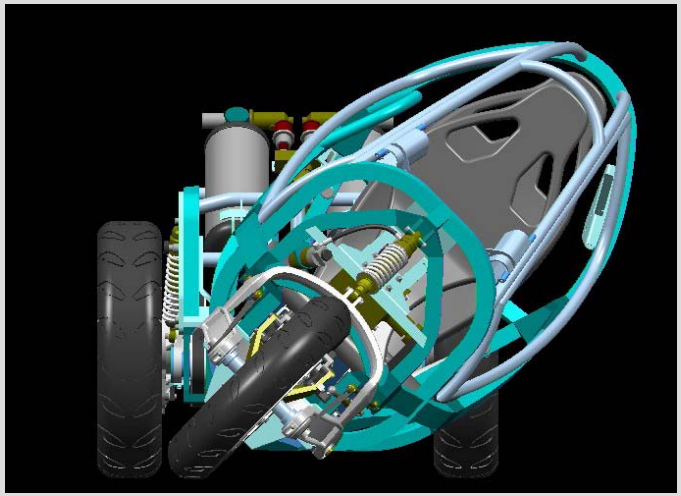
CLEVER TILTING MECHANISM

Due to the narrow track of the CLEVER vehicle, a tilting chassis is necessary to maintain stability in corners.
An efficient hydraulic system is employed to tilt the vehicle towards the centre of the corner. This is automatically controlled based on the driver inputs by an active direct tilt control system. This system also allows for car-like controls and has the advantage of keeping the vehicle upright while stationary.

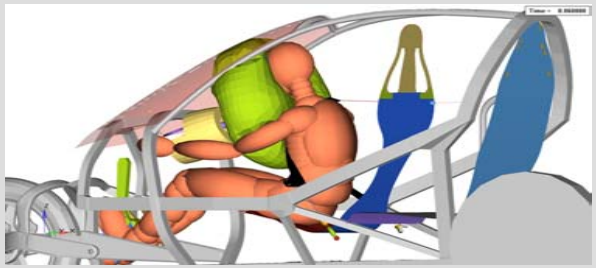


WHEELS & TYRES

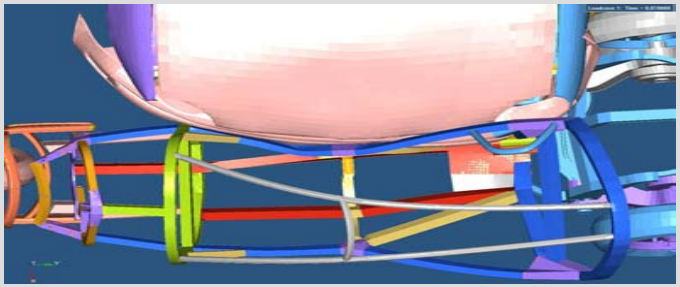
Because of this unique way of turning, the tyres need to be designed in conjunction with the tilting chassis development. The tyre design will incorporate not only the required handling characteristics but also a low rolling resistance, high durability, and a rain clearing tread design. Die-cast and machined magnesium alloy rims are used for reduced weight and crash absorption helping CLEVER achieve low fuel consumption and a high level of safety.

CLEVER SAFETY

The main aim is at least a 3 star rating in a EuroNCAP equivalent test procedure.
The dedicated energy absorbing structure keeps the maximum cabin acceleration below 55 g. CLEVER has a two-chamber driver air bag, a belt system with pretensioner and a dual stage load limiter.



Due to the stiff side structure of the cabin and the low vehicle weight, the intrusion can be limited in side impact collisions. The intrusion is expected to be comparable with conventional cars. Additional cross members will reduce the deformation. Therefore, a 3 star EuroNCAP rating will be achieved without any side airbags.



The vehicle's width reduces the risk of pedestrian accidents significantly compared to conventional cars. The shape of CLEVER also encourages a glancing impact in an accident reducing the possibility of contact between the pedestrian and hard vehicle parts.

CLEVER

Compact Low Emission Vehicle for Urban Transport

EU Project funded under the Growth Programme
Contract No: G3RD-CT-2002-00815

Partners:

BACKGROUND

The increasing need for individual mobility causes problems of high energy consumption, congestion and pollution within urban environments. One of the consequences arising from these problems is the increase in CO_2 emissions. It is necessary to find solutions that satisfy mobility needs while reducing environmental impacts. However, solutions that offer only mobility while complying with environmental regulations will not be accepted by the public, thus will not help to improve the situation.
The goal of the CLEVER project is the development of a small vehicle for clean urban transport taking into account styling, comfort and safety aspects as well as running costs.

CLEVER CONCEPT

The tilting three-wheeled CLEVER offers room for two occupants sitting in a tandem arrangement within the vehicle that is 3 m long and 1 m wide. The aluminium space frame cabin together with the full lining protects the occupants against weather conditions and offers a suitable passenger compartment stiff enough to withstand normal accident conditions.
Due to the natural gas (CNG) engine, the equivalent gasoline energy consumption is less than 2.6 l/100 km. A special refuelling system allows use of CLEVER in areas with no established natural gas refuelling infrastructure.
The vehicle development is accompanied by the investigation of the impacts CLEVER will have to urban transport based on CLEVER's market potential and comparison of energy consumption, pollution and safety with conventional cars.

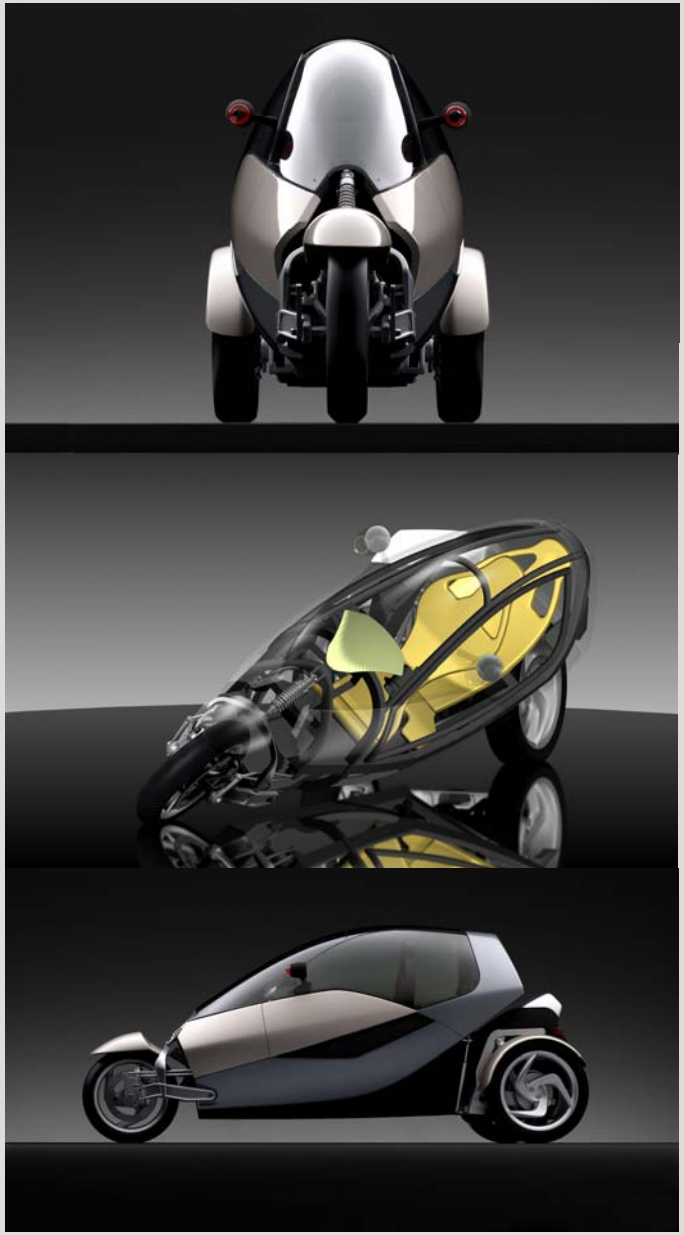
CLEVER C$_{ompressed}$N$_{atural}$G$_{as}$ Engine

The dedicated 213 cc single-cylinder CNG engine has a power of 15 hp and accelerates the CLEVER vehicle to 60 km/h in less than 7 s. Stoichiometric air-fuel mixture over the entire load and speed range is used to guarantee very low emissions; CO_2 emissions will be less than 60 g/km. Together with the CVT transmission a top speed of app. 100 km/h is expected.

CLEVER REFUELLING SYSTEM

Although the number of public CNG stations is continuously increasing, there are still European regions with a poor CNG refuelling infrastructure.

To facilitate the use of CLEVER in these regions, the vehicle is equipped with two gas cylinders that can be externally refilled after removal from CLEVER. Therefore, it is possible to exchange the cylinders e.g. at normal gas stations or supermarkets. However, the central refilling of both cylinders at public refuelling stations is also possible.



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