

An Emission-free Modular Vehicle Concept for Inner Urban Transportation in Near Future Megacities (Urban MoVe-T)

Authors: Oliver Deißer, Gerhard Kopp, Andreas Höfer, Jens König

As the demands for fast and sustainable transportation in megacities are growing, new transportation concepts with full electric vehicles for the distribution of goods are needed. Not only the “last mile” is important for the delivery of small goods, but also the distribution from the big logistic centres in the outskirts to the inner city has a big influence on the volume of traffic. A new concept for a zero emission vehicle, the “Urban MoVe-T” (Urban Modular Vehicle for Transportation) has been developed within the Institute of Vehicle Concepts to meet these new requirements. It consists of two parts, the “Ultra Mobility Tractor” (UMT) and secondly different “Intelligent Versatile Modules” (IVM). The concept of the one-axle-two-wheeled UMT is comparable to the well-known Segway® technology, but includes an additional driver cabin and an integrated safety cell for the driver. Moreover the UMT has an innovative wheel integrated bearing and chassis suspension system. This suspension system includes an innovative electric motor coupling, which enables to keep the unsprung masses low, while providing the unit compact. With the vehicle’s tractor module the driver has a high manoeuvrability, which is important, when used for delivery in historic city centres like Vienna. Coupled with the smallest Intelligent Versatile Module, the whole transportation vehicle has a total length of 2.5m and width of 1.7m, but is capable to carry two euro-pallets with a payload of 1t each. The vehicle has the highest payload per vehicle volume rate up to date. Due to its compact dimensions it enables the new concept to be integrated in existing infrastructures like into the commuter railway system. It can be parked transverse to the direction of travel of the train and can later on leave the train without changing the direction itself. The IVMs used for carrying the load all have 360° turn able wheels for manoeuvring on the spot to meet the requirements for the usage with the UMT. As all the IVMs have their own electric drive system, the load modules are able to drive independently when used on restricted sites like in distribution centres in the outskirts of the megacities. A bigger version of the IVM is able to carry six euro-pallets and has the dimensions of 3.5m length and 2.5m width; in total the tractor/load module combination has a total length as well as a turning radius of less than 5m, which is an unchallenged value for a vehicle in the sector of transportation. The big IVMs are also capable to be put autonomous onto the train for a fast and effective transportation from the distribution centre into the city centre. There the UMTs could fetch the IVMs and bring them to their destination. So a whole new effective distribution can be achieved with a significant reduction of the overall traffic on the streets of the big cities.