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## Design of innovative commercial vehicles for last mile delivery

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The commercial vehicles actually on the market lack general efficiency, in particular if the battery electric vehicles are considered. The main weaknesses are in weight efficiency, because their batteries reduce the available payload, in their volume efficiency, because their cargo volume is not fully exploited, and in the overall energy efficiency. One of the missions of these vehicles is, today, the last mile delivery. This market share appears as an expanding market in the next future. Therefore, it is possible to develop vehicles archetypes specifically oriented to this mission, considering the application of multidisciplinary approaches and different technologies which allow an increase of the overall efficiency, considering also the aspects related to the environmental impact and the cost reduction. In the design, it will be also necessary to consider the impact of the incoming autonomous driving on the main area of the vehicle.

In this square, the target of the work is the definition of guidelines for the design of optimized structures for the future commercial vehicles for last mile delivery. The work starts with a deep analysis of the requirements for future commercial vehicles considering the customers and manufacturers needs. The information obtained in the first phase of the work, are used to define innovative archetypes for the body structures. The impact of new cabin layouts and possible automated storage systems on the frame solutions are considered together with the adoption of battery electric powertrain.

The main activities are carried out developing and optimizing different solutions in virtual environment, considering the main missions of a vehicle body, mainly from the structural point of view. Therefore, weight reduction, occupants safety, cargo security, functional integration are considered in the optimization loops. The work allows the definition of guidelines for the design of future bodies of commercial vehicles with optimized global efficiency in particular in terms of weight and volume capacity.

**Autori principali:** LIDDI, Marco (Politecnico di Torino - Dipartimento di Ingegneria Meccanica e Aerospaziale); LANDO, Giovanni (Politecnico di Torino - Dipartimento di Ingegneria Meccanica e Aerospaziale); TOMASSI, Stefano (Politecnico di Torino - Dipartimento di Ingegneria Meccanica e Aerospaziale); SCATTINA, Alessandro (Politecnico di Torino - Dipartimento di Ingegneria Meccanica e Aerospaziale);

Relatore: SCATTINA, Alessandro (Politecnico di Torino - Dipartimento di Ingegneria Meccanica e Aerospaziale)

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