Aerodynamic and Flexible Trucks for Next Generation of Long Distance Road Transport

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Publishable Executive Summary

Future loading units will be smart and flexible. They face several technical innovations, which allow significant energy savings and faster processes. Within the Aeroflex project Deliverable 4.1 provides an extensive list of technical features, possible use-cases and relevant KPI for smart and flexible loading units. On this basis the following document analysed ready-to-market technical features and combined them into three technical concepts which should be tested within the project. They allow significant improvements regarding defined KPI.

These concepts and the most relevant results of the analysis are:

The multimodal concept: The AEROFLEX project plans to develop trucks with loading units which are flexible to be used on road or rail or (inland) waterways. Therefore the first developed concept describes the necesseray technical issues to guarantee the multimodal flexibility of loading units. The analyse shows that loading units like swap bodies or container do not have any problems on rail waggons, but the version with an aerodynamic optimised trailer will face serious challenges in compatibility with the most used technology – handling of trailer with a crane and transport in pocket waggons. Additionally to the aerodynamic optimised trailer including flexible roof, the concept includes basic telematics issues and optional tyre pressure management system.

The load space efficiency concept: With different technologies, this concept allows a highly optimised loading space including the double floor trailer, which additionally allows 50% more capacity for light products, transported on pallettes. It uses for example cameras to view the load while the loading process and the transport, and a software for optimised planning the loading space of the double floor capacity. Additional smart devices allow detailed tracking, tracing and controlling of the load.

The modularisation concept: The concept prepares for automated loading and unloading of trucks in future due to modularisation. It cooperates strongly with the Clusters 2.0 project, which develops small units on a trailer, which can modularise easily with focus on milk run transports. It is extended with transport optimization software.

Each concept can contribute to the energy efficiency target of AEROFLEX project, but effects are highly dependent on market and use cases. Some effects are in reducing the transport kilometre (=fuel efficiency) in optimisation of load space and transport routes due to software planning. For example, optimisation software for the whole logistics fleet of a company has effects up to 5-20% reduced transport kilometre, space utilisation in average 5%, in combination with double floor is has potential up to 50%. Others like the continuous tyre pressure measurement directly leads to less fuel consumption.

The technical features represent examples of current developments; further gains will arise due to the vision of physical internet (self-routing loading unit) and all the necessary innovation within the process to reach it. All three concepts show different parts of being prepared for physical internet.

The evaluations have shown that future loading units need to be flexible in the use of transport mode (Road, Rail and Waterway), need several “intelligent” devices, to have necessary data available and at the end, the technique should allow automation of the processes.

Deliverable 4.2 describes the three choosen concepts and their technical elements in sense of smart and flexible. It defines their potential efficiency improvements and serves as a basis for the other WPs of AEROFLEX to integrate the technologies in their designs and to test them in reality within WP6. The Deliverable 4.2 shows priority regarding the KPI defined in D4.1. The final decision, which parts can be tested in reality has to be done in cooperation with other WP depending on design issues in task 4.3.