



# AEROFLEX

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

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## Publishable Executive Summary

The mission of the AEROFLEX project is to support vehicle manufacturers and the logistics industry to become prepared for future challenges in road transport. The main objective of the AEROFLEX project is to develop and demonstrate new technologies, concepts and architectures for complete vehicles that are energy-efficient, safe, comfortable, configurable and cost-effective. Work package 1 contributes to the overall project objective by describing the needs of the European logistics market in order to enable a vehicle development in line with the market requirements. The present report represents deliverable 1.1. The objectives of this deliverable are:

- to describe the European transport market
- to describe trends and market drivers in logistics
- to describe variables which influences actor's modal choice in freight transport
- to derive first recommendations regarding use cases coming from the market analysis.

The results of the deliverable 1.1 are used in other work packages to support the selection of use cases. A first stakeholder workshop has shown that it is difficult to translate the requirements of the logistics service providers directly into technical details of new vehicle concepts. Therefore it wasn't possible to define primary candidates immediately and solely based on the input that was given by the FALCON project.

Instead, the results are based on the one hand on the analysis of literature and reports of European projects like TRANSFORMERS, FALCON or ALICE. On the other hand a first workshop with stakeholders (e.g. logistics service providers, shippers) have been conducted and analysed regarding user needs and requirements. The results and requirements are compiled as follows.

### **Increase of efficiency for freight transport**

First of all, the improvement of efficiency is one important driver of European freight transport market. Comodality and synchromodality are key elements to improve the efficiency. Freight transport should be organized by the consideration of the strength and weaknesses of the transport modes that are relevant to fulfil the requirements of the shipper that are defined by lead and transport time, weight and volume of the order /the shipment and further specific costumer and good related characteristics. The transport by only one transport mode could be the most efficient way in case the strength of this mode fulfil the given constraints, e.g. to carry goods due to time constraints, direct link between origin and destination without detours, availability of infrastructure and specialised equipment, sum of working time. Furthermore, it is necessary to fulfil the costumer related expectations regarding transport costs.

The available European data shows that in terms of tonne-kilometres, about 80 % of all freight transport is realised on long haul. Freight transport services up to 150 km are also relevant for new vehicle concepts in combination with smart loading units in order to support more efficient transport services at the interface between long and short distance transports e.g. in terminals and hubs. From the perspective of tonne-kilometres, new vehicle concepts could address all goods classes and not only selected ones due to the objective to develop a configurable and cost-efficient vehicle concept that is not dedicated for only some commodities.

### **Vehicle concepts should be developed for low density goods, long transport distances and high revenue logistics segments**

New vehicle concepts should address good classes with high transport performance measured in tonne-kilometres (e.g. food products, beverages and tobacco, agricultural products) in combination with long transport distances. Furthermore, the potential revenues in logistics segments (e.g. Contract Logistics, full and less than truck load with palletized goods and Courier/Express/Parcel) should be considered. These segments should be addressed, because the balance between market size, expected revenues and small order sizes expect a high demand for advanced vehicle concepts using modular loading units. Finally, it is recommended to realize an optimum trade-off between payloads and transport volumes in order to maximize the use of the loading capacities.

### **Fast and frequent road transport between hubs and industrial sites become important**

Due to the increasing amount of courier/parcel/express cargo and general cargo, hub and spoke concepts are increasingly used to consolidate the shipments and thus, to increase transport efficiency. Therefore, a promising and growing segment for new truck concepts can be identified in transports between hubs (e.g. terminals, ports,



huge warehouses) as well as between industrial sites and hubs. Here, it is essential that loading units can be optimally manoeuvred and placed at the gateways in cross-docking stations or in warehouses, even if there is a limited infrastructure conditions. Further, the organisation of a fast exchange of loading units between different vehicles or between transport modes is important.

#### **New vehicle concepts have to be compatible with the existing infrastructure**

Infrastructure conditions and constraints of the existing road infrastructure – road, bridges, yards, driveways, roundabouts, parking areas and docks – are key issues for new vehicle concepts. Currently, most parking areas and docks are not suitable for long commercial vehicles. The new vehicle concepts should be compatible with the existing road infrastructure to avoid an extensive enhancement of the European road infrastructure or sophisticated technical solutions supporting manoeuvring in confined spaces on motorways and inter-urban roads.

#### **Platooning, autonomous driving and the digitalization of logistics processes are relevant trends**

The digitalization of logistics processes supporting the driver, simplifying vehicle routing and route planning, and enabling the monitoring (e.g. smart loading units) of the whole transport chain is ongoing. Based on these digital opportunities, new transport services and processes are expected to emerge. Further approaches (in particular platooning and automated driving) reduce the stress for the driver and may contribute to a reduction of transport costs. However, they require sensors, communication technology and energy supply within the vehicle.

Further trends with an effect on the transport and the vehicle are seen in:

- Dematerialisation, i.e. the amount of materials used in products might be reduced.
- 3D-printing technology will be developed, i.e. personalised, small scale local production in regional production sizes or for spare parts retailing.
- Postponement of final product assembly, i.e. local assembly close to the consumer, leading to the transport of intermediate products (parts and components) rather than final products, with the potential to reduce the amount of space required for transport.
- Transport of Intermediary goods instead of final products is increasing and may enable a higher packaging efficiency and higher density of goods in the loading unit. This may help to meet volume restrictions.

#### **Use Cases should represent the European transport market**

The AEROFLEX project develops an innovative vehicle concept for a major percentage of the European transport market, which shall simultaneously contribute to an efficient overall freight transport system. The use cases considered in the AEROFLEX should meet the requirements of significant sub-markets in the current transport market in Europe. Based on the analyses we conducted, the uses cases should:

- include own account transports as well as transports conducted by own company and conducted by third parties (e.g. by logistics service providers)
- offer the possibility to use intermodal transport chains in cases of long transport distances
- address preferably logistics segments with high expected demand for advanced vehicle concepts like Contract Logistics, full and less than truck load with palletized goods and Courier/Express/Parcel, food products, beverages and tobacco
- address transports that are mainly conducted on motorway and inter-urban roads today.

It is not sufficient to identify and validate primary candidates only based on literature analyses and aggregated European transport and logistics data. Instead, is additionally necessary to get more information in direct contact with stakeholders and potential users of new vehicle concepts. Thus, further stakeholder workshops will be conducted within the Work Package 1. The results will be described in the deliverable 1.2.



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## Purpose of the document

This present document is the AEROFLEX deliverable D1.1 summarizes the first results of WP 1 in the AEROFLEX project and covers the following topics:

- Characterization of the European road transport market in general
- Description of the role of road transport in intermodal transport
- Analysis of load factors measured in France and the Netherlands
- Description of trends and drivers in the transport market.

The achieved results base on a literature analysis of European studies and project reports, an analysis of available data, and discussions with logistics service providers. The document describes the relevant information that has to be considered in the AEROFLEX project to determine the relevant and suitable use cases for new vehicle concepts. It gives necessary input to WP2-WP6 of AEROFLEX based on the requirements towards WP 1.

The figure below shows the schematic project plan with main phases and milestones within the project as a guide to better understand the Initial Dissemination Plan. The present deliverable contributes to Milestone 1 (MS 1) in the first quarter of the project.

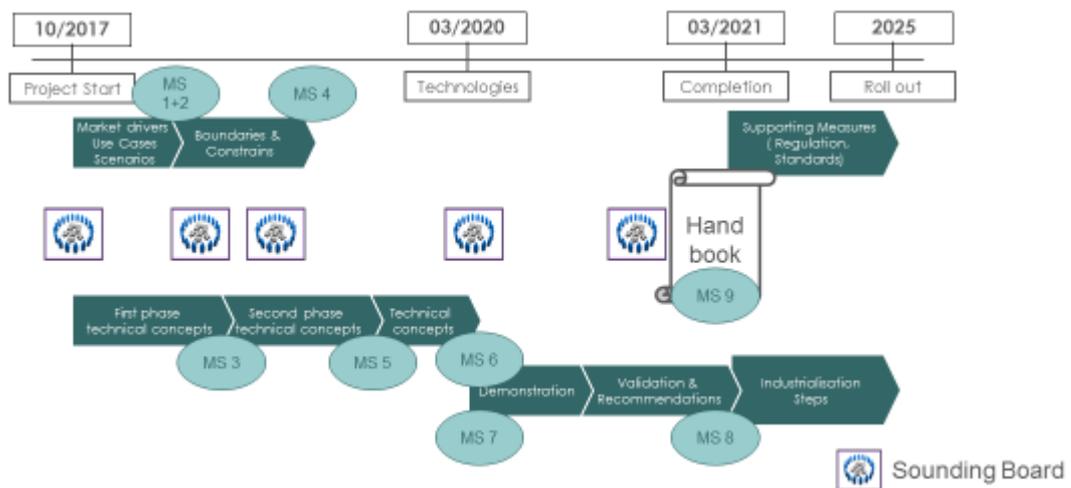


Figure Error! No text of specified style in document.-1 AEROFLEX Project plan, project phases and milestones

Several members of the sounding board were represented in the stakeholder workshop, which was contributed by WP 1. The sounding board consists of representatives from authorities, policymakers, and employees of logistics and manufacturing firms. The purpose of the sounding board is to advise the process of defining the recommendations for implementation of the solutions and measures developed within the AEROFLEX project.

In order to facilitate an efficient decision-making, three types of **dedicated meetings** with members of the sounding group during the course of the whole project are foreseen:

- Technical Assessment Assembly (TAA) –Initiatives leaders, research & industry partners & relevant associations
- Policy Regulatory Consolidation Group (PRCG) – Regulatory groups & Public administration
- Complete Sounding Group (CSG) – All type of stakeholders will be involved in such meetings.

Keywords of this deliverable are: vehicle engineering, logistics, road freight transport, vehicle concepts for heavy commercial vehicles (HCV), green logistics and trends

Supported by sub themes within the different keywords:

Multimodality, combined transport, intermodal transport, logistics hubs, smart loading units