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

Reporting

Project Information

AEROFLEX
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Coordinated by
MAN TRUCK & BUS SE
Germany

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Periodic Reporting for period 2 - AEROFLEX
(Aerodynamic and Flexible Trucks for Next Generation of Long Distance Road Transport)

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Summary of the context and overall objectives of the project

The transport sector contributes to about 25% of total CO2 emissions in the EU and is the only sector where the trend is still increasing. Considering the growing demand on the road transport system/ambitious targets of the EC’s Transport White Paper, it is paramount to increase the efficiency...
of freight transport. The Europe Green Deal initiative, demanding even more attention to targets and implementation of innovations as developed by the AEROFLEX partners. The vision of the AEROFLEX project is to support vehicle manufacturers and the logistics industry to achieve the coming challenges for road transport. The overall objective of the AEROFLEX project is to develop and demonstrate new technologies, concepts, and architectures for complete vehicles with optimized aerodynamics, distributed powertrains and safety systems as well as flexible and adaptable loading units with advanced interconnectedness contributing to the vision of a “physical internet”. The optimal matching of novel vehicle concepts and infrastructures is highly important, requiring the definition of smart infrastructure access policies for the next generation of trucks, load carriers and road infrastructure. The specific technical objectives, main innovations and targeted key results are:

1. Characterize the European freight transport market (map, quantify and predict), the drivers, the constraints, the trends, and the mode and vehicle choice criteria;
2. Develop new concepts and technologies for trucks with reduced drag, which are safer, comfortable, configurable, cost effective and ensure satisfaction of intermodal customer needs under varying transport tasks and conditions;
3. Demonstrate potential truck aerodynamics and energy management improvements with associated impact assessments of the new vehicle concepts, technologies and features developed in the AEROFLEX project.;
4. Drafting of coherent recommendations for revising standards and legislative frameworks to allow the new aerodynamic and flexible vehicle concepts, systems and loading units on the road. The overall goal is a 18-33% efficiency improvement in long haulage road transport by 2025+. An initiative is started to bring the need for SIAP on the European Strategic Agenda. All stakeholders, User-Provider-Planner-Policies are represented, and key people have shown commitment to address this key topic.

Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far

Significant was the agreement and completion of the concepts and the build of the demonstrators and equipment, planned to be finished by Mid-2020. WP1(Map and quantify load in EU and potential for configurable truck); results of the survey amongst 72 end-users (shippers, forwarders and LSPs) to identify most common use cases and prime candidates (vehicle concepts) to be used for the demonstration & impact assessment. Further activities were focussed on the modelling of the freight market forecast as input for objective 4. WP2(Advanced Energy Management Powertrain (AEMPT); the completion of the concepts of energy management system, the smart powered dolly for automated/autonomous driving in confined areas. The build of the demonstrator is started, and completion is planned for Mid-2020. WP3(Aerodynamic Features for the Complete Vehicle (AFCV); the CFD calculations to justify the choice of most promising aerodynamic features, the completion of the windtunnel model and the windtunnel testing program to verify the quality of the CFD calculations and later the air drag test, part of objective 3 demonstration & impact assessment. The completion of the demonstrator is planned for Mid-2020. WP4(Smart Loading Units (SML); the completion of the customer use case definition, the specification of the PUZZLE® software and CARGOCAM. The adaptations on the TRANSFORMERS trailer started to prepare the customer use cases Q2-2020 and later the demonstration & impact assessment WP6. WP5(Innovative Front-End Design for more Safety (IFEDS). The definition of the most common crash scenarios based on the activities. Further passive safety devices are developed and tested. For crashes with cars and VRU significant improved
survivability was proven. For truck – truck collision the use active safety systems seem the most appropriate solutions to improve survivability. Also, detection of VRU can help avoiding collisions, the most effective way to maximize their survivability. WP6(Demonstration, validation and analyses of feasibility); the Reference Testing program and the development of the impact assessment methodology, process, and tool/systems. The reference test program was very comprehensive according SAE standards. A major decision was to include a Control Vehicle along every reference test and in future every demonstrator test to ensure transparent and objective results. Lesson’s learned from previous project (e.g. Transformers) showed the benefit of developing the assessment methodology at an early stage. Already at this stage of the project results can be predicted and tested on reality. WP7(Recommendations and roadmap for a new regulatory framework). A Sounding Board, consisting out of representatives from authorities, policymakers, logistics of freight and industry, to guide and advice the process of defining the recommendations for implementation of the solutions and measures developed within the AEROFLEX project was formed. Phase 2 covered the intensive workshops with sounding board members extended with other stakeholders and a first discussion with the EU funded project ENSEMBLE to discuss in depth the way forward bringing the urgent need for intelligent access policies on the strategic agenda. A very positive signal is the number of SB members, currently over 60, showing a growing awareness for the need of IAP. WP8 (Communication, Dissemination and Exploitation). The communication and dissemination part are running and up to speed.

**Progress beyond the state of the art and expected potential impact**

(including the socio-economic impact and the wider societal implications of the project so far)

AEROFLEX develops technologies and standards for multimodal transport in Europe and assesses the impact, to deliver cleaner, safer, and more efficient road transport. In a paradigm shift in transport philosophy, the starting point for designing logistics and trucks is the loading unit, the basic packaging element. Technologies are developed for EC96/5312 – EC2015/719 vehicles, up to 44t GCW (Figure 1-3). An analysis is performed for EMS1 and EMS2 vehicles up to 74t GCW also for regional areas where the option for multi modal transportation is not given. The developed technologies, systems, vehicle concepts and future freight demands can be mapped, to prepare logistics service providers and carriers for multimodal transport. Modelling of freight market scenarios and the impact assessment methodology include scenario assessments on new vehicle concepts and systems, including market potential and outlook, and the definition of recommendations for a future regulatory framework. Smart infrastructure access policies are a must, not only regarding innovations developed in the AEROFLEX project but in general for all current running related EU funded projects. To maximize the societal impact and efficiency in logistics of freight in a multi modal context it is essential to implement. 1.Performance Based Standards for the safe and efficient use of the vehicles; 2.Intelligent Access Policies for the safe and efficient use of the multi modal infrastructure. The Aeroflex project is convinced and will prove improvements of 30% and more by significant improved survivability for VRU in crashes.
Overall concept, project delineation, major outcome and anticipated roadmap to implementation

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