PRESS RELEASE

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FUEL SAVINGS OF 12.8% ENABLE URBAN LAB 2 TO MEET ITS TARGETS

After eight months of development and seven months of testing its Urban Lab 2 vehicle, Renault Trucks has recorded a 12.8% reduction in fuel consumption and CO_2 emissions in urban and peri-urban environments, compared to a standard vehicle. This result was obtained by optimising aerodynamics, the drive train, tyres and vehicle-infrastructure communication.

Reducing the fuel consumption and CO_2 emissions of its vehicles remains a core concern for Renault Trucks. The EDIT (Efficient Distribution Truck), collaborative project was launched in 2016, involving Renault Trucks and six partners, namely Valeo, Lamberet, Michelin, BeNomad, INSA de Lyon (LamCoS) and IFSTTAR (LICIT). The aim of the project was to achieve a 13% reduction in fuel consumption in urban and regional use for controlled-temperature trucks.
The project produced the laboratory vehicle, Urban Lab 2, which, after seven months of testing and 4,500 km of driving on open roads or a roll-bench, achieved the initial targets. Urban Lab 2 uses 12.8% less fuel than the Renault Trucks D Wide (the reference vehicle), totalling a reduction of 3.5 litres of fuel and 9kg of CO_2 per 100 kilometres.

Test cycle and measuring methods

To build a test cycle that was statistically representative of controlled-temperature distribution use, engineers at Renault Trucks used a database containing over 8,000 km of measurements.

This open-road cycle consists of 12 km in urban environments, 50 km on regional roads and 57 km on motorways.

Prior to testing, both the Urban Lab 2 and the reference vehicle were run in on the roll-bench and a detailed performance report of the drive trains of the vehicles was drawn up to ensure the two vehicles used for the project were representative.

Testing was performed on roads, the roll-bench (where road and temperature conditions are simulated, controlled and reproducible) and using simulation software in order to correlate the measurements. Alongside this, tests were conducted with a reference vehicle with drive train and geometric characteristics similar to the laboratory vehicle (D Wide 19 t and 280 hp, fitted with a Lamberet refrigerated body). Each of the technologies developed under the project was evaluated separately.

Assessment of aerodynamic improvements

In collaboration with Lamberet, Renault Trucks worked on the aerodynamics of the truck and refrigerated body.

To improve airflow, evaporators were fitted into the roof of the body, whilst the refrigeration unit was installed in the wheelbase of the vehicle. Aerodynamic features were added, including rear spoilers and retractable textile side deflectors jointly designed by Renault Trucks and Lamberet. Access steps, streamlined wheel covers, a roof deflector, spoiler and cabin side deflectors were also fitted. Last but not least, a system of cameras replaced conventional wing mirrors.

Improvements resulting from aerodynamic fittings were measured on the motorway section of the test cycle. These measurements were recorded early in the morning to avoid any disturbance caused by wind, the speed of which was recorded at three separate points to ensure weather conditions were identical for the Urban Lab 2 and the reference vehicle. The test protocol was repeated seven times to ensure reliability of the results.

The results obtained were correlated using simulation to measure gains over the full cycle. Differences between tare weights and electricity consumption between the two vehicles were taken into account in the simulations.

The results of these tests confirmed that optimising aerodynamics is one of the key levers for reducing the fuel consumption and CO_2 emissions of distribution vehicles, especially when used in peri-urban environments.

Integration of the micro-hybrid system

A combination of micro-hybrid and Stop & Start technologies, designed with Valeo, was tested on the Urban Lab 2.

Several micro-hybrid system operating strategies were tested to maximise the energy recovered both during braking and over-run. In addition, considerable time and effort was devoted to engine stop/start strategies to reduce time and minimise vibration.

Three types of micro-hybrid system consumption tests were performed on the roll-bench:
- without the micro-hybrid system, in the standard configuration;
- with the micro-hybrid system, without the Stop & Start system;
- with the micro-hybrid system and the Stop & Start system.

The Stop & Start and micro-hybrid systems confirmed significant gains in fuel consumption, especially in urban environments.

Vehicle-infrastructure connectivity

Urban Lab 2 features an on-board navigation system developed by BeNomad, together with a traffic light communication system. This infrastructure connectivity enables the Urban Lab 2 to receive information from traffic lights and calculate whether it is more efficient to accelerate or brake.

To establish the impact of this technology on fuel consumption, measurements were first taken on the urban segments of the test cycle to characterise actual traffic and lights. A number of simulations took different traffic conditions into account and staggered start times were required to obtain reliable statistics.

Tests were then conducted on a closed circuit, followed by testing in real conditions on open roads in Bordeaux. The latter tests confirmed the accuracy of the algorithm taking control of the vehicle, in deceleration phase, to optimise fuel savings.

This driver-assistance technology provides significant improvements not only in fuel consumption and CO_2 emissions, but also in terms of driver comfort.

Reducing the rolling resistance of tyres

Urban Lab 2 is fitted with Michelin prototype tyres, developed to reduce rolling resistance without negatively impacting other performance criteria, such as safety, grip or longevity.

Tyre performance measurements were recorded on the regional and motorway sections of the cycle. Three testing sequences were conducted with the reference vehicle and demonstration vehicle to measure the increase in temperature and pressure of each of the tyres.

On this basis, a simulation model specially developed by Michelin measures developments in rolling resistance throughout the cycle. This enables differences in fuel consumption to be measured more accurately, compared to the standard method of using a fixed optimal rolling resistance coefficient (ISO value).

The EDIT project has confirmed the relevance of the technologies used in achieving the targeted reduction in fuel consumption. Work on the laboratory vehicle helps Renault Trucks to better understand the physical mechanisms that lead to this reduction and develop the technical solutions of its future products, in particular to meet future CO_2 emission standards.

Although Urban Lab 2 was not designed to be marketed in its current form, the most effective technologies in terms of performance may well be integrated in production vehicles.

About Renault Trucks

Building on the legacy of more than a century of French truck know-how, Renault Trucks supplies transport professionals with a wide range of services and vehicles (from 2.8 to 120 T) adapted to local and regional distribution, construction and long distance activities. Renault Trucks vehicles are sturdy and reliable with low fuel consumption that enables them to deliver greater productivity and control operating costs. Renault Trucks is distributing and servicing its trucks via a dealership network comprising over 1,500 service outlets. The design and assembly of Renault Trucks vehicles, as well as the production of most components, is carried out in France.

Renault Trucks is part of the Volvo Group, one of the world's leading manufacturers of trucks, buses, construction equipment and marine and industrial engines. The Group also provides complete solutions for financing and service. The Volvo Group, which employs about 95,000 people, has production facilities in 18 countries and sells its products in more than 190 markets. In 2017 the Volvo Group's net sales amounted to about SEK 335 billion (EUR 35 billion). The Volvo Group is a publicly-held company headquartered in Gothenburg, Sweden. Volvo shares are listed on Nasdaq Stockholm.

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