

Lyon / July 2013

## **A NEW RANGE DEVELOPED WITH THE BEST TECHNOLOGICAL TOOLS**

**In order to develop its new range of vehicles, Renault Trucks conducted the most stringent testing program in its history, on the open road and at its La Valbonne test centre site. The manufacturer also used the most highly sophisticated computer assisted design and development tools. We take a more detailed look at some of the major stages involved in developing a truck.**

### *Computer assisted simulation*

Computer assisted simulation is used at a very early stage in the truck's development, even before its design has been finalised.

The tools Renault Trucks now has at its disposal enable it to develop both the vehicle's interior and exterior. Using a special helmet and gloves, the virtual reality platform can simulate visibility, taking into account driver size and corpulence, as well as the ergonomics of the controls. It can also assess the quality of driving and resting comfort drivers experience by carrying out an analysis of life on board. *"Right from the beginning of the project, well before completion of the first prototype, the virtual reality platform enabled us to define the forms and layout of the controls on the dashboard together with the storage spaces, but also the size of the windscreen and the positioning of the rearview mirrors,"* explains Thierry Hours, vice president in charge of renewing the long distance and construction ranges.

On a par with the highest standards used in the automotive world, these tools also play a role in the actual production: *"Take the cabs for example,"* explains Thierry Hours. *"Thanks to the simulations, we didn't have to make any equipment prototypes, we just went straight to preproduction."*

All the information gathered with the use of simulation and the first test drives was used by the Renault Trucks design office. It was also valuable for its suppliers as well as for staff at the production plants - who used the information to develop the manufacturing processes that would ensure the products' high quality together with vehicle maintenance procedures for the Renault Trucks network.

### *3-D modelisation or stereolithography*

To develop the cab interiors for its new range, Renault Trucks employed the technique known as stereolithography, also used in Formula 1. This technology, based on a principle close to that of 3-D printing, uses computer files to produce prototype parts in a few hours and without any manufacturing tooling. The part is formed in a resin bath by solidification using a laser and, upon completion, is totally fault free. *"This technology brought us a great deal of flexibility and reliability,"* explains Thierry Hours. *"For example, it allowed us to test and quickly modify elements of the dashboard without the need of making any manufacturing tools until we were totally satisfied that the result would be in line with our demands."*

### *The electromagnetic chamber*

We may not realise it, but electromagnetic fields are encountered just about everywhere on the roads: at toll booths, under high-voltage cables, etc. To make sure that the vehicle's on-board electronics can operate with total reliability, Renault Trucks has developed a comprehensive testing procedure. In particular, this features an electromagnetic chamber which checks vehicles' electromagnetic compatibility and ensures their immunity. This laboratory is totally isolated from any exterior interference, being based on the "Faraday cage" principle: it is a perfect cube of metal with walls covered by carbon-filled polyurethane cones to avoid any electromagnetic field reflections. Inside it, vehicles are submitted to electromagnetic fields simulating all kinds of possible interference: from more than 100 V/m generated by aerials on frequencies from 100 kHz to 3 GHz. In the opposite direction, a further test ensures that the vehicle does not disturb its own environment or its own operation. All vehicles in the new Renault Trucks range have been tested in this laboratory.

### *Road and bench test trials*

First come the endurance tests on the test track. *"In twenty weeks the vehicles undergo the equivalent of a year's actual use,"* Thierry Hours tells us. The vehicles are tested at the Renault Trucks test centre in La Valbonne. Some of the trials take place at 90 km/h on a speed circuit, while others are on tracks that simulate extreme conditions by deliberately deforming the cab or vehicle body significantly, so that the vehicle can be tested to the extreme under all conditions. If a part breaks, it is analysed, immediately modified and then the engineers test it again to ensure optimum quality for the final end product.

As for the reliability tests, their purpose is to subject every part of the vehicle to the customers' typical patterns of use. Body, cab, and pneumatic and electric circuits are all tried and tested with respect to torsion and vibration on the test benches. The engines accumulate endurance hours on the test benches too, in every possible on-the-road situation. Life on board is not forgotten either, with tests that subject the doors and grille to misuse when being opened and closed.

All the electronic components are also put under strain on a specially designed bench that contains all the electronic functions inside the truck as well as those in the body and the engine.

Constant improvements are also made to the cab, which is tested on specially designed test benches as well. A cylinder system puts it into a series of extreme situations that test its solidity, shock absorption capacity, behaviour on the road and under difficult conditions, and longevity. In addition, for these vehicles Renault Trucks also conducted tests in a life-size wind tunnel, which helped engineers to optimise the trucks' aerodynamics and rework some parts to improve the fluidity of air flows and thereby reduce fuel consumption.

In all, these test bench trials amount to the equivalent of over five million hours of tests on all the vehicle components: body, cab, engines, gear-boxes and electronic components. All functions are tested and the operations are repeated thousands of times so as to be absolutely certain that every component works properly and is totally reliable.

At the same time, the new trucks are driven on the open road, so that they can be tested under real-life conditions with respect to features like fuel consumption, road holding, noise and vibration levels, and life on board during the daytime and at night. A total of thirty two different features are measured to ensure product quality, performance and reliability.

Renault Trucks also carried out several series of tests under extreme conditions, and at high and low temperatures. The 'extreme cold' trials took place during three winters in Lapland, where temperatures regularly fall to -40°C. The 'extreme heat' trials were conducted during three summers in southern Spain or Oman, where temperatures regularly reach 45°C, and can hit 60°C in the sun. *"During these trials, every aspect of the trucks is tested – road handling of course, how well they start after a really cold night, how they perform on seriously snow-covered roads or in thick dust – and life on board too,"* explains Thierry Hours. *"Our testers live and sleep in the vehicles, checking that the cab is sufficiently insulated, that the air-conditioning works properly, the heating, the demister, on board accessibility, even whether they can open the tool box when it's extremely cold! The idea is to find themselves confronted with all the different kinds of situations our customers might have to deal with."*

### *Engine testing*

In Lyon, Renault Trucks has an engine development and testing facility employing 1,000 people. It incorporates the means of testing the performance, endurance and consumption of the new range's drivelines. The introduction of the Euro 6 standard was a major challenge for the engine testing teams, for they were called upon to drastically cut polluting emissions while at the same time maintaining consumption comparable to, or less than, that of Euro 5 engines. The Euro 6 DTI 11 and DTI 13 engines have been equipped with a new injection system, new electronic architecture and a new depollution system. Over 600 prototypes were needed for their development, during which they were submitted to 300,000 hours of test bench trials. In parallel, the engines were also tested in vehicles, taking into account all possible operating conditions from -40°C to +60°C. In addition, the teams carried out simulations on test benches which took into consideration all outside parameters, from weather conditions to driver behaviour.

After seven years of tests, 10 million km covered under extreme conditions from -40°C to +60°C, tests conducted on 500 vehicles, 5 million hours of test bench trials and feedback from 50 customers, the new Renault Trucks range was unveiled in Lyon on 11 June 2013. The first orders received, together with its customers' enthusiasm, make Renault Trucks optimistic, despite the difficult market conditions. The first deliveries will be made to customers at the end of September / early October.

Further information is available from:

<http://corporate.renault-trucks.com>

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