

ULTIMATE

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Assessing the ergonomics of a car's design, its ride comfort, and character are draws on subjective notions that no digital tool can model. Simulators play a vital role in introducing the human factor from the outset into the process of designing a vehicle, driving aid, or even an accessory. **The strength of Ultimate lies in the life-like driving conditions it is able to recreate.**



- Safety
- Environment
- Life on board
- Mobility

▸ **Competitiveness**

BASIC FACTS

For many years Renault had operated a simulator that could reproduce driving sensations close to real-life experience. Yet although it recreated acceleration in steady driving conditions, its technology did not allow it to simulate brief, sudden movement, like swerving or pulling out. Yet they are often critical moments in real-life driving

conditions. Ultimate, commissioned in 2004, changed all that by introducing more degrees of freedom, so making new displacements available from the cockpit – technology that was beyond the capacity of previous-generation simulators. To further increase the real-life quality of the simulation, the driving environment

is displayed on wide panoramic screen that matches the driver's natural field of vision.

Ultimate has multiple applications. They make it possible, for example, to analyse a drivers' reactions to unexpected situations and evaluate their effect on vehicle behaviour. Other applications can also

IN SHORT

THROUGH ITS VERY LIFE-LIKE SIMULATION OF REAL DRIVING CONDITIONS ULTIMATE HELPS TO QUANTIFY A CAR'S BEHAVIOUR, COMFORT, ERGONOMIC DESIGN, AND SAFETY, WHILE IT IS STILL ONLY A DIGITAL MODEL, EVEN BEFORE THE PROTOTYPE EXISTS.



relate to the study of ride comfort or the ergonomic design of a hands-free kit and how they affect driver vigilance. Ultimate can work directly

from digital data in computer-aided design files, rather than real prototypes. The information it provides is therefore valuable for

optimizing and validating at a very early stage the solutions adopted for fabricating a new part, or even a car.

HOW DOES IT WORK?



Like some previous-generation simulators,

Ultimate's cockpit, which recreates a car's cabin, is mounted on six hydraulic jacks – technology borrowed from the aerospace industry. The way in which they move and travel together reproduces the rolling, pitching, yawing, and longitudinal and lateral accelerations that characterize the behaviour of a car on a road.

But the crowning feature of

Ultimate, which augments the real-life experience, is that the six jacks are mounted on a platform that can move fore and aft and to and fro on rails. Travel can be as ample as seven meters, and the platform's motion combines with the movements from the jacks. These new degrees of freedom strengthen considerably

the sensation of movement experienced by the driver.

In order to simulate real life

more effectively Ultimate has a panoramic screen with a horizontal viewing angle of 150°. The solution does away with the need to align images from traditional simulator screens – one central and two side screens – which limited the realism of earlier simulations. And to totally immerse the driver in a virtual world, he/she can don a stereoscopic headset instead of looking at the screen.

It offers a 120-degree horizontal and 67-degree vertical field of view, while allowing the wearer to explore the full 360-degree virtual environment by turning his/her head.

Ultimate is controlled and managed by the second-generation simulation software, Scanner.

It synchronizes the platform's displacements with the images displayed on the screens. It incorporates software from the Vehicle Dynamics Function, called Mada (French-language acronym for Automobile Dynamics Advance Modelling), which contains a comprehensive model of how the simulated car behaves on the road. Finally force feedback devices give the driver in the simulator a physical feel of the car's reactions. The engine's temperament, how it reacts on braking in corners and on accelerating are all faithfully reproduced, as are 80 other parameters that allow the simulator to adjust its reactions to match those, real or computed, of the vehicle being tried out. To test the reactions and driver-vehicle interaction, unexpected traffic situations can be programmed. Their aim is to assess how effective driving aid systems are in surprise situations or when the driver reacts inappropriately.

Ultimate was the result of a European project that began in 2001.

It was driven by Renault and involved numerous partners. The Laboratory of Physiology and Perception (a joint venture between the National Scientific Research Centre (CNRS) and Collège de France) provided its knowhow in the field of cognitive sciences. The Dutch company Rexroth-Hydrauldyne designed and adapted its mobile platform to support the cabin. Finally the British company Seos developed the display systems and the finetuned the virtual reality headset, better suited to some situations than the wide screen.