



Total driving simulation

Technology to be able to simulate faster accelerations and higher velocities which will be possible in tomorrow's vehicles

Automated vehicles are always evolving as car manufacturers develop new technology and designs to facilitate this new way of traveling. As with any dramatic technological change, testing is essential before introducing anything to the real world. This is especially true for autonomous vehicles, which need to be able to guarantee the safety of passengers and other road users. Renault is looking to develop new autonomous driving solutions, and has invested in a new simulation system in order to test them effectively.

The reason why new simulators are necessary is that in the autonomous vehicles of the future, the passengers won't be traveling in the same way. Seats may be turned to face the opposite way to the

direction of travel, and all passengers may be looking down at laptops or tablets instead of where they're going. This creates a different set of challenges for car manufacturers, both in terms of safety and also things like motion sickness.

Renault already operates driving simulators, but needed technology to be able to simulate faster accelerations and higher velocities which will be possible in the new vehicles. As VHT had provided one of the original simulators to Renault in 2003, VHT were asked once again to provide a new motion system for the next generation simulator. Working together with AV Simulation, which supplies the dome and simulation software, VHT was able to provide a new system to meet the more demanding requirements.



A different way to drive

To create a more accurate simulation, Renault asked for longer stroke lengths, higher velocities and faster accelerations. The stroke lengths help to give the simulation the space required to generate the sensation of continued acceleration and motion for longer, while a more modern approach was required to be able to meet Renault's specification of velocities up to 9 m/s.

Working together with Renault and AV Simulation to come up with the right specifications at the right budget level. The solution provided consists of an XY table and a hexapod, where the stroke length is 15m on both the X and Y axes. In the world of driving simulators, this is a significant size and allows for a more accurate simulation. The use of linear motors for the drive system was the best way to reach the velocities they required.

Everything provided by VHT forms the motion system for the simulation, which thanks to the innovative use of linear motors together with wheel construction engineering, is able to meet Renault's specifications. AV Simulation collaborated with the VHT team to engineer a dome and projection system which brings this new simulator to life.

A new world of simulation

There are many advantages to the VHT motion solution for this simulator, especially when compared to alternative technologies. Before this system, many vehicle simulators were based on rack and pinion technology combined with standard runner blocks, which worked for the purpose at the time, but the limitations meant that for Renault, a new approach was required. Because of the high velocity and forces there was no off-the-shelf solution, so VHT developed its own. For the guidance system VHT used a wheel construction, which also helped break the 5 m/s threshold of older simulator technology. This combination of motion technology has really opened up a new world for driving simulations.

Big project, big results

This simulator is unique in that it can accurately replicate different kinds of driving, from going fast on sweeping bends to slowly driving in a city. Any new technology, or new engineering approach, presents its own challenges, but VHT, together with AV Simulation and Renault, solved them all. Everyone in the whole team came together. One major deadline was the factory acceptance test - an important milestone in a development like this. To ensure VHT made the deadline, all the engineers worked together to make it happen, which was a great effort.