

Beyond Reality



Jaguar LandRover CAVE

Since May 2008, the automotive industry's most advanced Virtual Reality Centre has been at the disposal of JLR's Engineers thanks to the experience of one of the world's leading developers of Immersive Visualisation technology, HoloVis International...

In a 3m cubic room, reminiscent of the *Star Trek Holodeck*, and comprising of four rear-projection walls and ceiling, a Jaguar XF seat is the centre of attention. As the Jaguar LandRover Engineers power-up a highly specialist computer-cluster the screens come to life around them with ultra-high resolution imagery. The Engineers use the seat to sit 'in' a completely virtual representation of a Jaguar XF, and by wearing the special glasses, the imagery on each wall suddenly becomes a truly photorealistic immersive 3D representation of the vehicle.

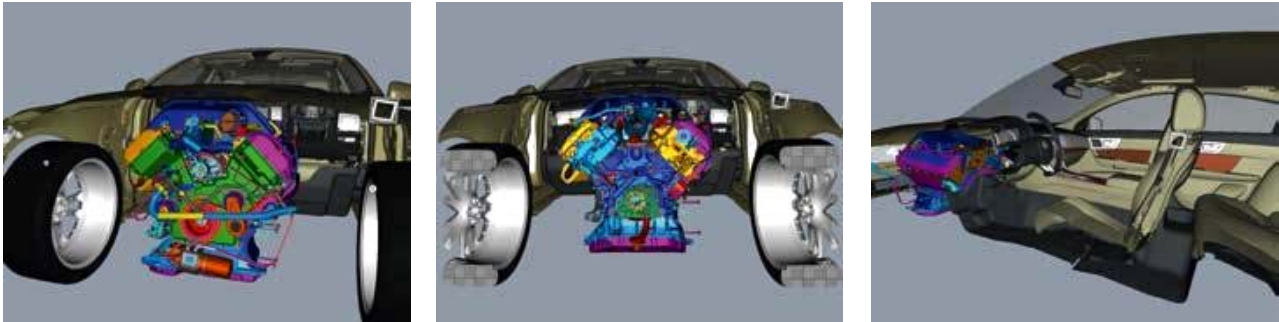
Although the Engineers know they are sitting in the real seat, their eyes are now deceiving them and convincing them they are sat behind the wheel of an XF, the interior of which appears accurate in every detail. Although highly impressive, this system has a very serious purpose as an engineering tool for JLR's future vehicle development. What they are experiencing is the result of an innovative project that has culminated in the building of the automotive industry's most advanced Virtual Reality CAVE solution (CAVE Automatic Virtual Environment), designed, built and supported by one of the world leaders in this technology, a UK-based company HoloVis International.



In the CAVE, as the lead Engineer turns his head he is able to look around the interior of the XF just as if he was in the real thing. He can also reach out and touch the steering wheel and interact with any of the car's switches. To enable this level of control the CAVE has a sophisticated motion-tracking system embedded into the corners of the screens. This technology allows the Engineers head and hands to be tracked in 6DOF (degrees of freedom) ensuring that wherever he looks the imagery is geometrically correct and he can interact with the vehicle in a natural way.

With a hand-interaction device, Engineers can also select processes to test, investigate and manipulate the virtual vehicle. One such process is a *cross-section* tool - as the Engineer moves the device across the car, it cuts away at the surfaces and in doing so all of the vehicle's components are revealed in a perfect cross-sectional 'cut'.

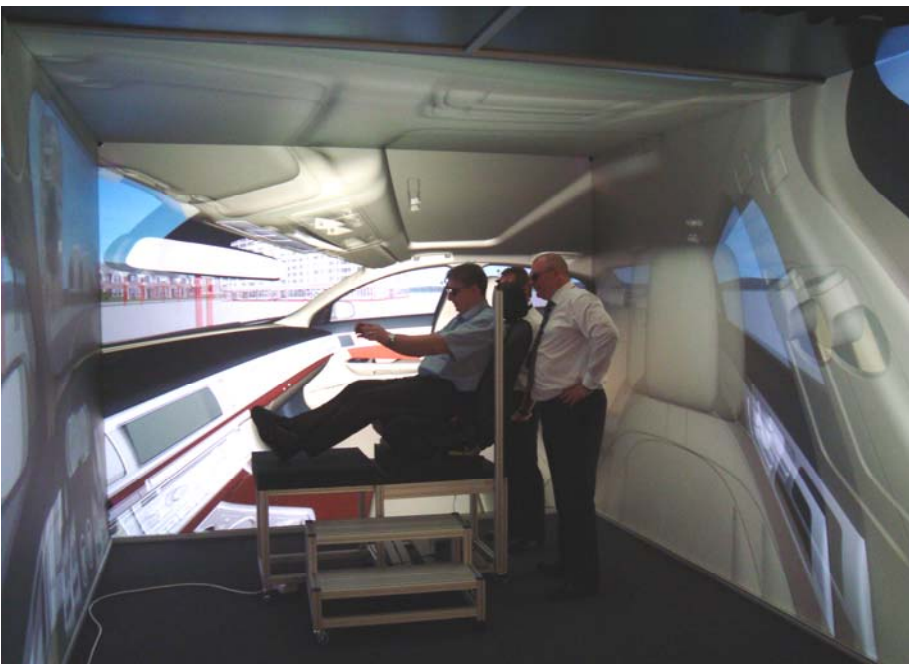
By activating 'collision detection' the Engineer can select components within the vehicle, such as the starter motor, and perform a virtual removal procedure. The collision detection ensures that the motor cannot move through a space that, in the real world, it wouldn't fit. This feature is particularly useful to service engineers as they can assess any maintenance job before a car is completed. Other processes include how things such as brake pipe routings and materials can be assessed with the properties of a specific supplier's material loaded into the system. The benefits of being able to assess different materials and routings in this scenario, long before physical manufacture, are obvious.



Cross-section tool in action - cutting back, layer by layer, exposing every part of the vehicle from the engine and its components to the last nut, bolt, hose and cable

VR technology is allowing Engineers to evaluate rapidly and effectively all stages of the design process, cutting down on very expensive prototype 'bucks' and allowing changes to be made and re-assessed quickly.

HoloVis International, worked for 18 months with JLR, prior to the project commencing, to assess the latest technology and test-out various solutions at their extensive Manufacturing and Design facility in the Midlands. The final structure for the CAVE is one of the largest in the world for this type of setup. Due to the requirement for a seamless ceiling rear-projection surface, as well as the three side walls, a specialist aluminium framework had to be designed to house a total of eight Sony 4K-resolution projectors (world's highest resolution at the time of the project), six at ground level to run the three side walls and two above to run the ceiling projection surface.

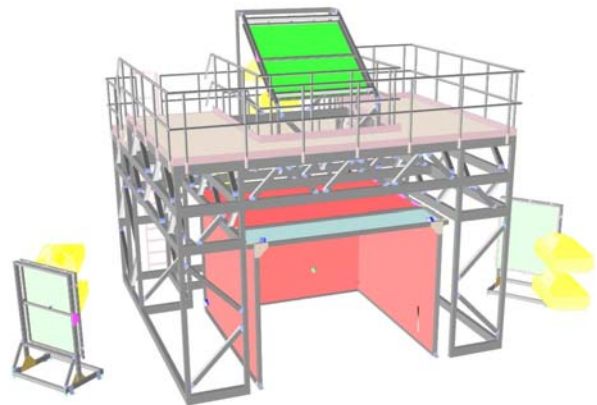
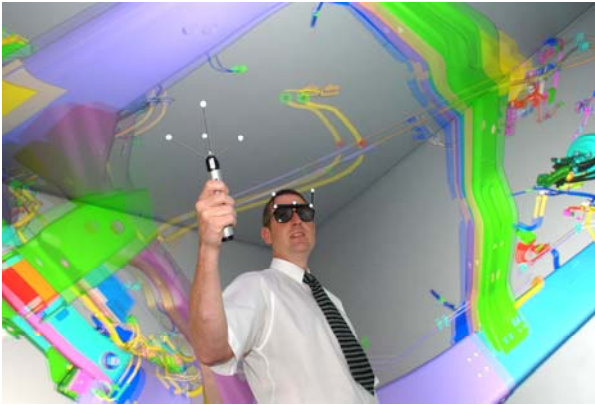


HoloVis not only design and build these advanced solutions; they have their own 4-Wall CAVE system (with a rear-projection floor!) and a full-scale rear-projection 4K *ApolloWall* at their UK headquarters.

These systems serve for three key purposes - to demonstrate the technology and show the capability of HoloVis, to allow their key software partners such as Autodesk, to test and develop software packages on high-end systems, and finally as a hireable secure facility for clients that cannot afford such capital intensive technology. HoloVis also

has portable versions of their systems that they regularly take all over Europe to events and to clients' sites for personal demonstrations and project hire.

As a key part of the design and verification phase of the project, HoloVis used their own VR systems to show virtual representations of what the CAVE would look like and ‘walked’ the client through the facility virtually long before anything was physically built on their site at Gaydon, UK.



Stuart Hetherington, Managing Director of HoloVis comments “Since the JLR CAVE went operational in May last year, the facility has become a mission-critical tool, essential to the on-going development of JLR’s future engineering solutions, it is now making measurable cost savings against physical prototyping and testing that would have been required at JLR before the system was available.”

He goes on to say “As someone that used to work, just over 13 years ago, in automotive physical and destructive testing I appreciate the vast costs and time associated in physical mock-ups and testing. It is fantastic to see how our technology is now essential and at the core of the vehicle design and testing process, our turn-key systems are helping clients make substantial savings, something that is vitally important in the current economic climate and with the challenges facing the automotive industry.”

For further information on the JLR CAVE and HoloVis solutions & services, please contact HoloVis at:

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