New Virtual Development Tools specific to Design Development at Volkswagen Commercial Vehicles

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Abstract from talk

For VOLKSWAGEN COMMERCIAL VEHICLES, one of the main factors in the success of a vehicle is optimum and high-quality vehicle ergonomics for drivers and passengers alike. Increasing functional performance in relation to safety, comfort, and communication requires cohesive design both in terms of visibility and operation so that the driver is not overburdened. Yet as a directly opposing force to the constantly increasing development demands incurred by the growing complexity of the vehicles, model cycles are becoming ever shorter. To meet these demands, and to secure long-term competitiveness, not only innovative products are needed but also optimised product creation processes. To achieve this, virtual development tools are being applied more and more in product creation at VOLKSWAGEN COMMERCAL VEHICLES.

On top of those techniques already well established to a very large degree, such as for example the simulation of rigidity values, aerodynamics, etc, and to work with virtual three-dimensional vehicle models for the purpose of data acquisition, VOLKSWAGEN COMMERCIAL VEHICLES is also using virtual techniques for assessing ergonomic comfort.

To this end, the Virtual Reality Ergonomics Test rig (**V**irtual **R**eality **E**rgonomy **P**rüfstand, **VREP**) and the **M**obile **A**ugmented **R**eality **P**latform (**MARP**) have been developed.

The central component of the VREP is virtual reality goggles (**HMD**, **H**ead-**M**ounted-**D**isplay), in which the user sees a complete vehicle interior and virtual surroundings. This allows the user to sit in a stationary body structure within an ergonomic environment corresponding to the vehicle being visualised, and to move and interact freely in the virtual scene, i.e. in the virtual vehicle. This in turn enables assessments to be made of visibility conditions, operating situations and activity sequences in a virtual environment. The MARP extends the operational spectrum of the VREP by providing the possibility of ergonomics evaluation in the moving vehicle. A key part of the MARP is again an HMD. In this case, however, the user also sees his real surroundings as a video image with a positionally-correct virtual vehicle interior blended into it. But in contrast to the VREP, the user sits in a modified and drivable vehicle and, thanks to the combination of real surroundings, real vehicle impressions and virtual vehicle interior, the driver is given the impression that he is driving the virtual vehicle.

Visualisation of a vehicle interior only requires the components' CAD data as a basis. Using this enables even at very early phases of the product development process – directly after the first CAD data is created – a largely complete vehicle interior to be represented, and the first ergonomics assessments to be carried out. In future it will be possible to blend

alternative package designs in and out “at the push of a button”, and so allow them to be compared directly with one another.

Substitution by virtual parts - made possible by way of VR simulations - of real vehicle components fitted to a physical model also allows visible representation of partially abstract construction design data at a very much earlier stage than was previously possible. This in turn means that decisions can be taken earlier, and, due to the representational possibility of a large number of alternatives, that they can also be taken with greater reliability.

The two tools, **VREP** and **MARP**, are presented in detail in this talk, and a number of application examples put forward. From this and on the basis of results from acceptance analyses, the general implementation capability of these tools is demonstrated.