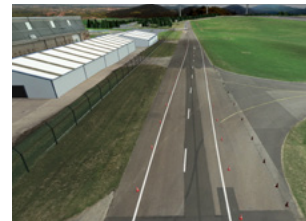




# Virtual Worlds for Vehicle Engineering

Autonomous driving functions and driver assistance systems such as parking or lane departure warning systems are considered pioneering technologies in the automotive industry and are already an integral part of modern vehicles. However, before they can be put on the road, they need to be tested and validated. Our “Dynamics, Loads and Environmental Data” department has developed a new module in the VMC<sup>®</sup> (Virtual Measurement Campaign) tool suite for this purpose: The VMC<sup>®</sup> Road & Scene Generator.

Current methods often fail to reflect the diversity and complexity of the real world. For example, in manually created simulation models, there are often only simple basic intersections that rarely occur in the real world. However, modern assistance systems must ensure safety at all times – even in complex traffic situations. This requires realistic models of the environment.



*Left: Real scene (photo)  
Center: 3D scan  
Right: Virtual 3D scene*

## Multi-Level Generation of Environment Models

The VMC<sup>®</sup> Road & Scene Generator focuses on the creation of virtual worlds that depict public roads or test sites as required. The generation can be based on high-precision measurement data, such as measurements from the department’s own “REDAR” measurement vehicle. However, the software package also offers another special feature: the module delivers valuable results even without detailed measurement data. “Thanks to the VMC<sup>®</sup> database, which contains worldwide, georeferenced data on roads, topography, land use and traffic, we can create digital 3D maps without having to carry out measurements on site. If required, we merge this data with other available information, such as that provided by surveying offices,” says expert Tim Rothmann. If individual attributes are missing from the process, such as the number of lanes or width of a road, our researchers supplement these

with customized prediction models based on regional or typical road conditions. Although this does not result in an exact representation of reality, it produces sufficiently realistic approximations for many applications. Thanks to the efficiency of the approach and its global availability and diversity, the Fraunhofer ITWM makes a significant contribution to the effectiveness and feasibility of scenario-based safeguarding concepts.

## One Module, Many Applications

The VMC<sup>®</sup> Road & Scene Generator always offers the right solution depending on the requirements: for simulations based on simple abstract information such as road network descriptions, as well as for more complex applications that require detailed and photorealistic 3D models or an exact replication of the real environment. “We offer the optimum balance of variability, degree of realism and effort,” explains Rothmann.

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