

Complex 3-D data on all devices

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If you want to be sure that the person you are sending documents and pictures to will be able to open them on their computer, then you send them in PDF and JPG format. But what do you do with 3-D content? "A standardized option hasn't existed before now," says Dr. Johannes Behr, head of the Visual Computing System Technologies department at the Fraunhofer Institute for Computer Graphics Research IGD. In particular, industry lacks a means of taking the very large, increasingly complex volumes of 3-D data that arise and rendering them useful – and of being able to use the data on every device, from smartphones to VR goggles. "The data volume is growing faster than the means of visualizing it," reports Behr. Fraunhofer IGD is presenting a solution to this problem in the form of its "instant3DHub" software, which allows engineers, technicians and assemblers to use spatial design and assembly plans without any difficulty on their own devices. "This will enable them to inspect industrial plants or digital buildings, etc. in real time and find out what's going on there," explains Behr.

Software calculates only visible components

On account of the gigantic volumes of data that have to be processed, such an undertaking has thus far been either impossible or possible only with a tremendous amount of effort. After all, users had to manually choose in advance which data should be processed for the visualization, a task then executed by expensive special software. Not exactly a cost-effective method, and a time-consuming one as well. With the web-based Fraunhofer solution, every company can adapt the visualization tool to its requirements. The software autonomously selects the data to

be prepared, by intelligently calculating, for example, that only views of visible parts are transmitted to the user's device. Citing the example of a power plant, Behr explains: "Out of some 3.5 million components, only the approximately 3,000 visible parts are calculated on the server and transmitted to the device."

Such visibility calculations are especially useful for VR and AR applications, as the objects being viewed at any given moment appear in the display in real time. At CeBIT, researchers will be showing how well this works, using the example of car maintenance. In a VR application, it is necessary to load up to 120 images per second onto data goggles. In this way, several thousand points of 3-D data can be transmitted from a central database for a vehicle model to a device in just one second. The process is so fast because the complete data does not have to be loaded to the device, as used to be the case, but is streamed over the web. A huge variety of 3-D web applications are delivered on the fly, without permanent storage, so that even mobile devices such as tablets and smartphones can make optimal use of them. One key feature of this process is that for every access to instant3DHub, the data is assigned to, prepared and visualized for the specific applications. "As a result, the system fulfills user- and device-specific requirements, and above all is secure," says Behr. BMW, Daimler and Porsche already use instant3DHub at over 1,000 workstations. Even medium-sized companies such as SimScale and thinkproject have successfully implemented "instantreality" and instant3Dhub and are developing their own individual software solutions on that basis.

Augmented reality is a key technology for Industrie 4.0

Technologies that create a link between CAD data and the real production environment are also relevant for the domain of [augmented](#)

[reality](#). "Augmented reality is a key technology for Industrie 4.0, because it constantly compares the digital target situation in [real time](#) against the actual situation as captured by cameras and sensors," adds Dr. Ulrich Bockholt, head of the Virtual and Augmented Reality department at Fraunhofer IGD. Ultimately, however, the solution is of interest to many sectors, he explains, even in the construction and architecture field, where it can be used to help visualize building information models on smartphones, tablet computers or data goggles.

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