Forecast: It's getting cloudy

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Generating 3D models from point clouds, walking through virtual construction sites and projecting tunnels into rooms. New technologies open up new opportunities - for PORR and our customers.

More and more point clouds are sweeping through the construction industry. And this is no weather forecast. Point clouds make it possible to compare the actual status of a building with the planning models and to check construction accuracy. They can also be used for billing purposes. They are usually created using laser scans or photogrammetry, in which image material – often from drones – is analysed. The accuracy is impressive and enables precise measurements directly within the point clouds. But this precision comes at a price: many scan positions are required, the data volumes are often very large, and post-processing is usually time-consuming.

New point cloud formats

The latest developments in point cloud technology, which was originally designed for the film industry, could also revolutionise the construction sector. Neural radiance fields, or NeRFs for short, and Gaussian splatting, for example, calculate spaces less precisely, but reconstruct them by predicting colours and densities along light rays. This speeds up the creation process considerably. The accuracy of these methods is currently still somewhat lower, but they enable much faster processing and reduce the difficulties with transparent or reflective surfaces – a problem that is still unsolved with conventional methods. We can already generate rough point clouds and 3D models using smartphones, tablets, and suitable apps. Soon, even short mobile phone videos could be enough to generate accurate models within a few minutes, which we could use efficiently for construction and compare with the planning models.
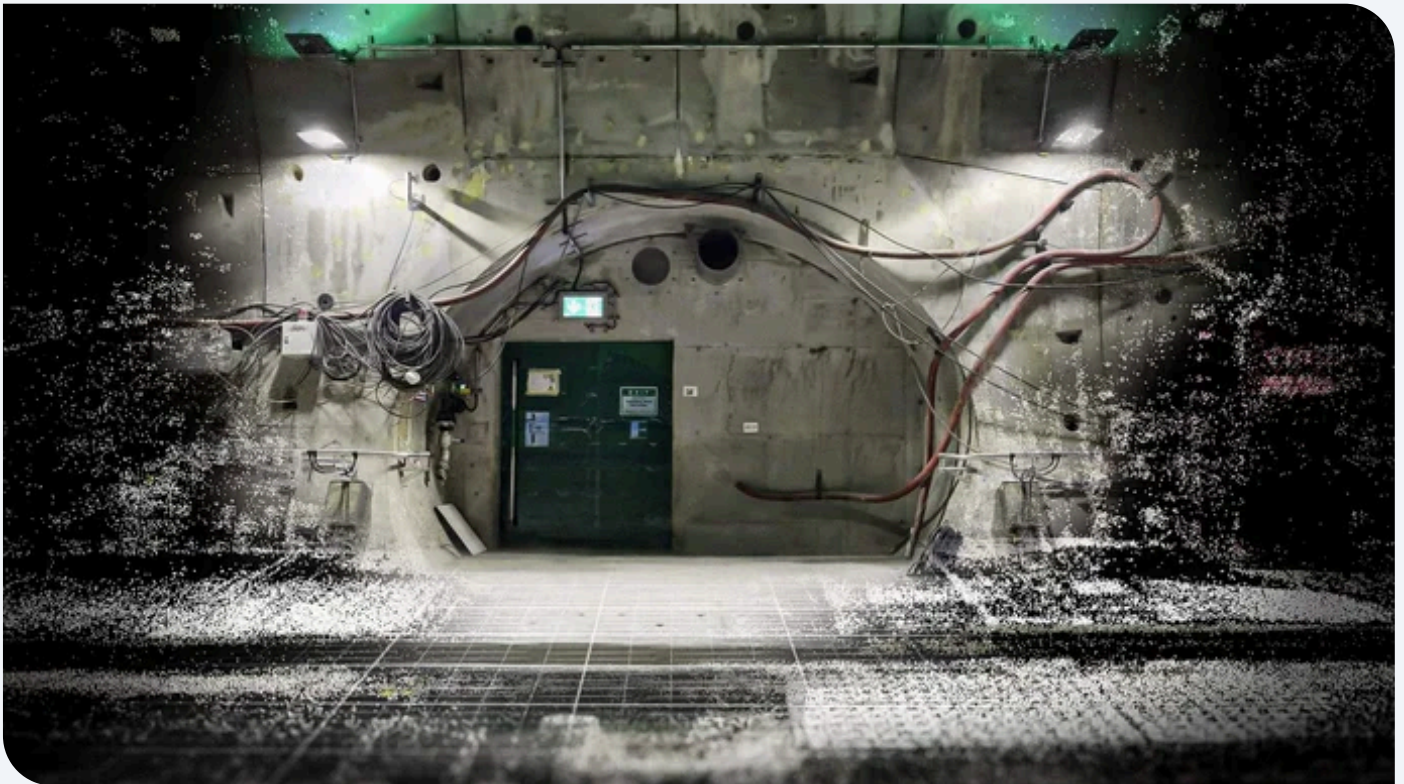
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Virtual reality

A few years ago, initial tests with our customers showed how construction models can be viewed together in virtual reality (VR). However, the technical and financial expense was considerable: VR headsets had to be connected to powerful computers using long cables in order to display complex models in real time. Today, their use is much less complicated and less expensive. Inexpensive VR headsets and user-friendly apps load models directly into the headsets – without an additional computer. Teams at different locations can move through the model together in real time, and communicate via the headsets' integrated microphones and speakers. Any problem areas identified can be saved in the model in standard file formats and checked later. Virtual building inspections have improved considerably. Thanks to cost-effective hardware and powerful software, they can be used at any time and make collaboration using VR a real pleasure for almost all users.

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Augmented reality

IImagine being able to project a 3D model of a building or tunnel into the room right in front of you, rotate it with your hands, scale it, and take it apart. And other people in the room can also see this model and work on it interactively with you. What was once only seen in science fiction films is now reality. A team of developers from a leading tech company is working extensively on this technology and has already made impressive progress. Although everyone involved still has to wear modern XR glasses, the devices are becoming lighter and more comfortable. High-resolution cameras on the front of these kinds of glasses capture the sur roundings and seamlessly superimpose digital 3D models on top. In the VR room of **pde Integrale Planung GmbH** at the **PORR** headquarters, you can experience how the model appears when you put on the glasses. And suddenly disappears when you take them off. Almost like magic.

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