

Digital Twin and “Click & Build”

From 3D Acquisition to Automatic 3D Modeling

Production of a digital twin, a 3D copy of reality, enables innovative solutions along the lifecycle of buildings, manufacturing processes, and products. The concept developed by the Institute for Information Management in Engineering (IMI) and its Industry 4.0 Collaboration Lab is the first of this kind that uses a central service to supply all 3D inventory data independently of the hardware and software. Automatic generation of 3D models from point clouds using the “Click & Build” technology is of crucial importance. In cooperation with partners from industry and research, IMI develops new digital transformation methods for medium-sized and large enterprises as well as new approaches for Germany to remain a location of industry.



3D model of an infrastructure facility.

New Process Optimization Methods

Digitization is associated with a number of possibilities to optimize existing processes and enter completely new paths. Work is not only aimed at reducing costs, but also at enhancing flexibility and saving time.

In the areas of Digital Factory or Building Information Modeling (BIM), recording of the building inventory and modeling are key technologies opening up new virtual worlds. The exhibit illustrates 3D digitization of a construction project using a laser scanner and a drone as well as modeling of the data. Research focuses on the supply of universal 3D data and on automatic modeling on the basis of the data measured.



Helicopter with 3D laser scanner and drone with a camera.



Reality on a Data Platform

The process starts with the precise acquisition of the inventory data in three dimensions and the generation of high-resolution panorama pictures. The large 3D data volumes are then processed and made available on a central data platform. Intuitive operation enables rapid access without any long training. The platform allows for the direct export of 3D point cloud sections to various target applications. Using the "Click & Build" technology, the digital model can be produced and updated easily based on the point cloud of the inventory data.

Click & Build

The "Smart Point Cloud" represents an area of research, in which classical and AI algorithms are used to link a point cloud to a 3D model. In this way, individual objects can be identified and made available for further processing. New algorithms developed by IMI and its Industry 4.0 Collaboration Lab support the user in transferring measurement data to automatically generated CAD objects by just one click (Click & Build). 3D digitization of inventory data is a major prerequisite for the production of a digital twin and for all BIM processes. Using the digital twin, operation concepts can be validated in real time and decision-making can be supported during the BIM lifecycle based on latest, transparent information.



3D model of a production hall.

Karlsruhe Institute of Technology (KIT)
Institute for Information Management in Engineering (IMI)
Industrie 4.0 Collaboration Lab
Michael W. Grethler
Kriegsstraße 77
76133 Karlsruhe, Germany
Phone: +49 (0)721 608-46628
Email: michael.grethler@kit.edu



Karlsruhe Institute of Technology (KIT) · President Professor Dr.-Ing. Holger Hanselka · Kaiserstraße 12 · 76131 Karlsruhe, Germany · www.kit.edu

Karlsruhe © KIT 2019