

Geometric Quality Assurance within the Research Cluster IntCDC

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SUMMARY

Since 2019, the Institute of Engineering Geodesy (IIGS) is involved in the German Research Foundation (DFG) cluster “Integrative Computational Design and Construction for Architecture” (IntCDC) in several fields. The researchers are from architecture, structural engineering, building physics, engineering geodesy, manufacturing and systems engineering, computer science and robotics, humanities and social sciences. Highly interdisciplinary research is demanded. This paper will focus on the research activities of IIGS in the field of geometric quality assurance for the construction process.

After a short introduction of the cluster IntCDC, the basic definitions and structure of quality model (e.g. quality characteristics, parameters and criteria as well as control and decision points) are given. The way a quality model can be integrated for quality assurance of construction process will be explained. The construction product can be broken into four levels of hierarchy: building, construction, component and material. Terrestrial laser scanning (TLS) is used to control the geometry of the components. One example for a construction the process of pouring graded concrete which use less mass of material (e.g. use hollow sphere) while load-bearing capacity requirements can still be kept. The size and the position of the hollow spheres within the graded concrete plates have to be determined. Another example for a completely different construction process is the technical quality control of the production of coreless filament winding components. The cross sections of fibre composites which are the base for lightweight building components were measured and estimated. The latter example will be introduced in detail, its challenge, intermediate results will be presented. The second phase of the funding period began in middle of 2022, one of the new focus will be construction for the extension of existing buildings. Planned and first realized activities related to geometric quality control will be outlined in this contribution.