The Research Cluster Integrative Computational Design and Construction (IntCDC) – Current Engineering Geodetic Contributions

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SUMMARY

The German Research Foundation (DFG) cluster "Integrative Computational Design and Construction for Architecture" (IntCDC) is hosted by the University of Stuttgart and the Max-Planck Institute for Intelligent Systems. The cluster aims to lay the methodological foundations to profoundly modernize the design and building process and related building systems by adopting a systematic, holistic and integrative computational approach. The non-linear co-design of methods, processes and systems is a key methodology cluster to reach this target. Interdisciplinary is given by the participation of researchers from architecture, structural engineering, building physics, engineering geodesy, manufacturing and systems engineering, computer science and robotics, humanities and social sciences.

Engineering geodesy covers the challenges related to geometry. Within this overview article the authors will focus on the research activities of the Institute of Engineering Geodesy (Insti-tut für Ingenieurgeodäsie - IIGS). The investigations are within two Research Projects (RPs) "Robotic Platform for Cyber-Physical Assembly Process" and "Holistic Quality Model". Be-sides the general outline of the projects, intermediate and exemplary results will be presented.

For the first RP the interdisciplinary work is realized together with our colleagues from the Institute for System Dynamics as well as from the Haptic Intelligence Department from the Max Planck Institute. The IIGS has a 4-tachymeter-realtime-network that provides position and attitude angles to control a spider crane. Two solutions will be compared, a one prism so-lution supplemented by an IMU measuring the three attitude angles and a two-prism solution, where the IMU has to provide one attitude angle only.

The second RP aims at developing a Holistc Quality Model that includes social, environmental and

technical quality aspects. The IIGS is working together with colleagues from Institute for Social Science as well as form the Institute for Acoustics and Building Physics. On the one hand a general framework considering quality characteristics, parameters and criteria as well as control and decision points was created. On the other hand very specific quality control and assessment was carried through by e.g. determining the cross sections of fibre composites that are the base for lightweight building components.