



From the Drone to the BIM-Model - A Method for Creating As-Is Models in Bridge Construction for the Use Case of Digital Bridge Inspection

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Abstract

The implementation of Building Information Management in bridge construction and public administration continues to progress. As part of the research project "Public Administration 4.0", a prototype for digital bridge inspection was developed for this purpose, based on the creation of BIM models of existing bridge structures. International studies attest to the method of photogrammetric point cloud generation based on drone images, for the intended use of existing bridge modelling, a high potential. In the course of a feasibility study, a creation process chain - with the drone to the BIM model - could be derived and the results generated could be considered applicable. The creation process consists of three sequential phases: as-is data acquisition, point cloud generation, and as-is modelling. The generated as-is model of the bridge can be implemented in a BIM software and used for digital bridge inspection and additional use cases.

Keywords: as-is model, BIM, bridge inspection, creation process, drone, mesh, photogrammetry, point cloud

1 Introduction

Building Information Management is becoming increasingly important due to the promotion of digitalisation both in the construction industry and in public administration. The "Public Administration 4.0" research project is focussing on the development of a procedural and technological prototype for carrying out a digital bridge inspection, in which damage recording on the BIM model plays a central role [1]. The creation of the required as-is models proves to be a special task due to the often insufficient as-is data and often challenging accessibility in bridge construction. However, the modelling process based on photogrammetrically generated point clouds has emerged as a promising solution [2] and will be described in more detail in this paper. In the second chapter, the basics of the process components are described. It starts with the creation of as-is models as a bottleneck in the implementation of BIM for

existing buildings, as the BIM approach is model-based. And ends with the main components of the creation process: drone, data set, photogrammetry and point cloud. In the fourth chapter, the creation process is explained in detail and the individual process steps are discussed. The last part of the research contains a list of further process potentials. The final section discusses the results and provides a summarised conclusion.

2 Basics of the process components

2.1 The bottleneck of BIM-implementation

Research and working groups around the world are focusing on the potential of BIM methodology in existing buildings. [3] The research focus is on the one hand on the overall process chain and on the other hand on finding solutions for individual sub-process chains. The creation of as-is models can be emphasised as a key topic with enormous development potential and can also be identified