IMPLEMENTATION OF REALITY CAPTURE IN CONSTRUCTION INDUSTRY

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The construction industry is experiencing digital transformation and with an ongoing pandemic the need of finding a new way to work remotely has increased. The construction industry in general and construction management in particular depends on the physical workplace to follow up on the progress of the project. But the restrictions that have been imposed in many workplaces have limited the visits to the project site. As a result, a gap has arisen between the production team and the rest of the project teams. The main purpose of the thesis was to find a new digital method that minimizes the need to be on the construction site and instead make it possible to manage the construction site remotely. In practice, it would look similar to Google Street View, but instead it will be possible to view a site project in real-time in 360° images. Reality Capture and 360° cameras are the techniques behind the implementation.

Reality Capture is the process of collecting data by using laser scanners and photogrammetry. The main purpose of collecting data is to create a digital copy of the reality with point clouds and meshes. Today, there are several development companies that offer Reality Capture applications in the construction industry and Reconstruct is one of them. Reconstruct is a cloud-based program that brings together Reality Capture, drawings, BIM models and schedules in one common place. The documentation of the construction site can be done by using a 360° camera and uploading the video files to Reconstruct. Following that, the process of creating point clouds can be done in Reconstruct. This will result in having 3D-models of the project that can be compared with the BIM-model. It will also offer 360° images that are linked with each other, where the user can conduct virtual tours in the construction site.

During the implementation, the software Reconstruct has been applied in a reference project where a group of different professional workers have evaluated the software and the concept behind Reality Capture. The implementation was based on a hospital project in Malmo, Sweden, which was the reference project, with an area of 108 000 square meter and budget of 4.3 billion SEK. A quantitative and a qualitative analysis have been adopted in this study. The implementation of Reconstruct resulted in a total of 66 film files that were captured in eleven different floors. Out of 66 film files, 32 700 360° images have been created.

In the evaluation survey, 10 out of 12 of the respondents answered that they think 360° images in the construction site can optimize or help them with their tasks in the project. The majority of respondents mentioned that it was easy to use Reconstruct. However, most of the respondents were not satisfied with the software's performance. This was primarily due to the fact that the respondents used computers with a poorer processor than what was recommended by Reconstruct.

Based on the evaluation questionnaire and the implementation, this thesis has come to the conclusion that Reconstruct is a good tool for visualizing the construction site and 360° image material have different areas of application, for example the image material can give additional ground at project meetings. According to the project members who participated in the evaluation questionnaire, using Reconstruct at time where many had to work at home was a great solution to still be connected with the project. Furthermore using 360° image material can increase accuracy of inspections and minimize the risks at the construction site due to the fact that risks can be detected in the early phase.

The project manager of the reference project mentioned in the survey that instead of bringing many people into the workplace, 3D models can be used to inform others about the current stage of the project. Furthermore, the cost analysis showed that when using Reconstruct can result in reduction in travel with 85%, reduction in inspection work with 50% and reduction in re-work with 2.58 million SEK by assuming that Reconstruct can prevent 1% of rework.

What does the future hold for Reality Capture in the construction industry? Using Reality Capture as a documentation tool is an effective method to collect data in an organized way. The data can be used during production but there is also the potential in using the saved data during the operation and the maintenance of the building. Reality Capture should be seen as a tool that complements physical workplace visits. Subcontractors, the client and other hired consultants will be more involved in the production by conducting virtual site visits. Virtual visits are a solution that can primarily be used by actors who do not work close to the construction site but the technique can also be used by supervisors and other actors who are involved in the construction and want to monitor the progress more effectively.