

Using Collaborative Immersive Environments and Building Information Modeling Technology for Holistic Planning of Production Lines

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Abstract. Large and complex building projects need many different experts from different engineering disciplines for different matters. But these experts each use their own IT tools that produce a lot of heterogeneous data. This leads to a strong fragmentation of competencies, what causes problems for interdisciplinary collaboration, because the data might be inconsistent, redundant or there are no interfaces to combine the data. These problems in collaboration increase the risk of planning mistakes that might significantly impair the overall project success. So only one database should be used for all engineering tasks to improve the transdisciplinary collaboration. The Building Information Modelling (BIM) working methodology enables the digital collaboration of virtual production planning and architecture tasks for developing a building. By means of lean optimization in combination with early integration of future-oriented production facilities, process-relevant production data can be included in the planning phase before construction begins. This article presents a real time immersive 3D virtualization system using the digital twin of complex buildings with a modern production line as the single source of truth and creates a consistent integrated data model, that enables transdisciplinary collaboration of all involved engineering disciplines. In this way, a continuous comparison can be made between the real construction project and its digital twin in an interactive, intuitive and collaborative manner. The same model is also used by production planners to optimize the material flow and in general the value chain of a production line through a holistic planning, which brings many benefits for all stakeholders.

Keywords. Transdisciplinary collaboration, immersive environments, building information modelling, virtual reality, production planning, smart factory, digital engineering

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