

Exploration of Building Information Modelling Software to Develop Modular Coordination Design Tool for Architects

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Abstract : The utilization of Building Information Modelling (BIM) in the construction industry has provided an opportunity for designers in the Architecture, Engineering and Construction (AEC) industry to proceed from the conventional method of using manual drafting to a way that creates alternative designs quickly, produces more accurate, reliable and consistent outputs. By using BIM Software, designers can create digital content that manipulates the use of data using the parametric model of BIM. With BIM software, more alternative designs can be created quickly and design problems can be explored further to produce a better design faster than conventional design methods. Generally, BIM is used as a documentation mechanism and has not been fully explored and utilised its capabilities as a design tool. Relative to the current issue, Modular Coordination (MC) design as a sustainable design practice is encouraged since MC design will reduce material wastage through standard dimensioning, pre-fabrication, repetitive, modular construction and components. However, MC design involves a complex process of rules and dimensions. Therefore, a tool is needed to make this process easier. Since the parameters in BIM can easily be manipulated to follow MC rules and dimensioning, thus, the integration of BIM software with MC design is proposed for architects during the design stage. With this tool, there will be an improvement in acceptance and practice in the application of MC design effectively. Consequently, this study will analyse and explore the function and customization of BIM objects and the capability of BIM software to expedite the application of MC design during the design stage for architects. With this application, architects will be able to create building models and locate objects within reference modular grids that adhere to MC rules and dimensions. The parametric modeling capabilities of BIM will also act as a visual tool that will further enhance the automation of the 3-Dimensional space planning modeling process. (Method) The study will first analyze and explore the parametric modeling capabilities of rule-based BIM objects, which eventually customize a reference grid within the rules and dimensioning of MC. Eventually, the approach will further enhance the architect's overall design process and enable architects to automate complex modeling, which was nearly impossible before. A prototype using a residential quarter will be modeled. A set of reference grids guided by specific MC rules and dimensions will be used to develop a variety of space planning and configuration. With the use of the design, the tool will expedite the design process and encourage the use of MC Design in the construction industry.

Keywords : building information modeling, modular coordination, space planning, customization, BIM application, MC space planning

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