

Applying Geodetic Coordinate Reference Systems within Building Information Modeling (BIM)

Robert Kaden and Christian Clemen (Germany)

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SUMMARY

In the field of Architecture, Engineering and Construction (AEC), digitalization has been developed from a 2D geometry representation to an object oriented 3D information modeling, called Building Information Modeling (BIM). The scope of BIM is the continuous use of digital building models within all phases of a building live circle, from the planning phase to the operation and finally demolition phase. The so called BIM method is coming more and more into practice and leads thereby to a comprehensive change of working techniques and working methods within the building industry.

In Germany, the Government acknowledged BIM as a major step towards utilizing the opportunities presented by digitalization. In December 2015, Alexander Dobrindt, Federal Minister of Transport and Digital Infrastructure, officially announced that the use of BIM will be mandatory for all transportation projects by the end of 2020. In order to allow a correct planning using BIM, especially for large, elongated projects such as streets and railways, the curvature of the earth and the projection of coordinates cannot be ignored by architects and civil engineers. Also surveyors will have to deal more and more with BIM data, e. g. deliver BIM conform as-build plans or extracting set-out coordinates from BIM projects.

Within this paper, the differences of the understanding of coordinates in both domains, the architecture/civil engineering and geodesy/surveying domain, are discussed in detail. It is explained, which types of coordinates are used within BIM projects and how correct geo-referencing can be achieved. On the other hand, the common geodetic coordinate reference systems and map projections are explained and their influence on the working steps using BIM projects. Furthermore, possible errors are shown on practical examples. Finally, the limitations in interoperability are shown and how coordinate reference systems can be represented using the BIM

open data model and exchange format Industry Foundation Classes (IFC). This paper aims to be a manual for both domains, architecture/civil engineering and geodesy/surveying, to increase the awareness of the importance to consider possible and applied coordinate reference systems and projections during the project phases of Building Information Modeling.

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