Analysis of BIM methodology implementation in structure projects

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Abstract

Building Information Modelling (BIM) methodology is currently widely used in a large number of sectors linked to the construction industry. The present work intends to conduct a state of knowledge regarding the BIM technology, mainly focusing on the development of the structural project. In the study, the capability of BIM-based tools applied to the structural design is analysed and an optimized work-flow, from the viewpoint of the structural engineer, is presented. BIM structural models of two study cases were created, the consistency of the correspondent analytical model is verified and the transposition process of the model to the structural analysis software is carefully examined. During the process inaccuracies are identified and adjustments are referred in order to optimize the application of BIM methodology on structure projects. The assessment of the level of interoperability is based on the analysis of the quality from the information transposed between software and from the consistency of the final product.

Keywords: BIM; Structural design; interoperability; data work-flow.

1. Introduction

The Building Information Modeling (BIM) is a growing methodology in Architecture, Engineering and Construction (AEC) industry. The BIM methodology emerges as a new way of working between designers, supported in a collaborative environment and involving various specialties [1]. BIM methodology is characterized by the project execution on a collaborative manner through appropriate working tools, allowing a better understanding of the project and congregating, in a single three-dimension (3D) digital model, all the necessary information for project development, construction and building maintenance [2]. So, the main concept of the BIM methodology is based on the centralization of information of the various subjects in one 3D geometric model, the BIM model.

BIM is under the scrutiny of many building professionals questioning its potential benefits on their projects and as a term and method that is rapidly gaining popularity [3]. Chen and Luo [4] explored the advantages, not just using the 3D BIM model, but using BIM in 4D (3D + time) applications for quality control on construction planning, integrating it with product, organization and process data structure.

Currently there is a need to provide training opportunities for civil engineering students [5] and professionals in order to align knowledge with BIM adoption status in the industry [6]. So, currently it is essential to introduce the BIM capabilities into the work-flow civil engineering companies, focusing in all aspects where BIM can introduce enhancements.

The BIM methodology is not simply a technological adjustment, but essentially a change in procedures [1]. The concept, on BIM is based,