

Building Information Modeling (BIM) in construction management: a safety approach

Vahid shahhosseini^{1,*}, Ali daroogheh²

¹ Assistant professor, Amirkabir University of Technology (Tehran Polytechnic), Department of Civil and Environmental Engineering, Tehran, shahhosseini@aut.ac.ir, Tel: +982164543012

² Msc student, Amirkabir University of Technology (Tehran Polytechnic), Department of Civil and Environmental Engineering, Tehran, ali_daroogheh@aut.ac.ir, Tel: +989352796788

ABSTRACT

Building Information Modeling “BIM” is becoming a better known established collaboration process in the construction industry. Owners are increasingly requiring BIM services from construction managers, architects and engineering firms. Many construction firms are now investing in “BIM” technologies during bidding, preconstruction, construction and post construction. The goal of this project is to understand the uses and benefits of BIM for scheduling and safety in construction industry. There are two objectives to this project. First is to focus on analyzing 3D and 4D BIM as well as BIM based scheduling. Second is to identify Automatic Safety Checking of Construction Models base BIM. As a result, the developed automated safety checking platform informs construction engineers and managers by reporting, why, where, when, and what safety measures are needed for preventing fall-related accidents before construction starts. The safety area reviewed is fall protection.

Key Word: Building Information Model (BIM), safety, construction, 3D and 4D modeling

1. Introduction

The construction industry has experienced a gradual decrease in its labor productivity since the early 1960s. In the meantime, the non-farm industries such as the manufacturing industry have increased their labor productivity. The reduction of labor productivity in the construction industry requires more labor hours per contract dollar amount. This indicate that construction industry is lacking the development for labor saving ideas. In the past two decades more than 26,000 U.S. construction workers have died at work[1,2]. That equates to approximately five construction worker deaths every working day. As these statistics indicate, safety in construction remains a big problem. The sad reality of frequent loss of life, injuries, near-misses, and collateral damage is that they pose liabilities that can be prevented. Safe construction requires care and planning throughout the project lifecycle, from design, through construction planning, through construction execution and extending into operations and maintenance. As good safety practices and records create a positive, hazard free, and productive work environment, planning for safety at the front-end of a project is not only the first but also a fundamental step for managing safety[3]. Safety planning can be seen as a part or dimension of the construction production planning. In several other disciplines it has a key role in the field of production planning. However, in the construction sector safety planning has been carried out to a certain extent as a separate task in respect to other production planning and control tasks. For example, concrete falling protection plans are prepared only for projects which have clear or even urgent needs for such plans. Safety communication in the worker level is particularly challenging under the site conditions. Partly for these reasons the construction accident rate has remained very high compared to other industries. Table 1 illustrates the status of construction safety in some countries and it can be inferred that construction safety is a perennial global problem.

The Building Information Model is primarily a three dimensional digital representation of a building and its intrinsic characteristics. It is made of intelligent building components which includes data attributes and parametric rules for each object. For instance, a door of certain material and dimension is parametrically related and hosted by a wall. Furthermore, BIM provides consistent and coordinated views and representations of the digital model including reliable data for each view. Building Information Modeling (BIM) is the process and practice of virtual design and construction throughout its lifecycle. It is a platform to share knowledge and communicate between project participants. In other words, Building Information Modeling is the process of developing the Building Information Model. The growing implementation of Building Information Modeling (BIM) in the AEC/FM¹ industry is changing the way safety and

¹ Architecture Engineering Construction / Facilities Management