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НАДЛЕЖАЩАЯ МЕТОДОЛОГИЯ АВТОМАТИЗИРОВАННОГО МОНИТОРИНГА В ПРОЦЕССЕ СТРОИТЕЛЬСТВА

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Применение новых новаторских технологий, которые структурированы, на этапах проектирования и строительства, преимущества получаются за счет реализации и разработки каждого из проектов. Некоторым вкладом в проектирование будет: соответствие ожиданиям заказчика, список материалов, приближение количества, визуализации (планы), перспективы дизайна, управление пространством и сбор данных анализа для проектирования конструкций.

На этапе строительства: визуальный обзор дизайна проекта (3D), моделирование процесса строительства, окончательные количества, обмен информацией между различными техническими дисциплинами для координации и мониторинга в реальном времени в течение жизненного цикла. Вышеизложенное дает представление и стимулы против традиционной и авантюрной методологии использования Информационное моделирование зданий (BIM) в качестве инструмента Информационно-коммуникационные технологии (ИКТ) для создания и улучшения в различных областях, таких как управление строительством на структурной стадии проекта.

В этой статье представится и объясняется автоматизированный мониторинг и его количественную съемку в процессе строительства.

Ключевые слова: строительство, информационное моделирование зданий, информационно-коммуникационные технологии, автоматизированный мониторинг.

PROPER AUTOMATED MONITORING METHODOLOGY IN PROGRESS OF CONSTRUCTION

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The application of new pioneering technologies that are structured, in the design and construction stages, obtained through the implementation and development of each project. Some contributions to the design will be: compliance with customer expectations, list of materials, approximation of quantities, visualizations (plans), design perspectives, space management and acquisition of analysis data for structural design. In the construction phase: a visual review of the project design (3D), a simulation of the construction process, final quantities, exchange of information between different technical disciplines for real-time coordination and monitoring during the life cycle. The above gives the perception and incentives against the traditional and adventurous methodology in using Building Information Modeling (BIM) as an Information and communications technology (ICT) tool to build and provide improvement in various areas and stage of construction.

This article tries to introduce and explain automated monitoring, and its quantity surveying in construction process.

Keywords: construction, construction, building information modeling, information and communication technologies, automated monitoring

INTRODUCTION

Modern construction is characterized by a high rate of introduction of new materials, calculation methods, design solutions and working methods. Under these conditions, methods of empirical study of building structures play an important role. In the field of building behavior study, in recent years, there has been a trend towards a wider use of automated systems to assess the current technical condition of building structures and structures. In the meantime, Building Information Models (BIM) are increasingly attracting many researchers to automate construction progress monitoring projects [1]. The BIM is a comprehensive software which has the capability of comparing the 3D geometry of all components by considering their descriptions and relations [2] and inventories and quantities information for the whole project participants. It can provide the 4D model which is the combination of 3D geometry and schedule quality control (3D + time) [3]. Application of these models during construction process can be expanded by combination of BIMs with as-built models.

The Building Information Model (BIM) has provided a very suitable basis for automated construction progress monitoring. BIM is a comprehensive digital representation of a building that includes not only the 3D geometry of all its components but also a semantic description of the types of components and their relationships [4].

To capture the actual state of the construction project, various methods can be applied, including laser, scanning and imaging methods. With both points it is possible to create clouds bearing the coordinates of points on the surface of parts of the building but also for many different temporary objects that were not designed in BIM.

Monitoring systems currently in use as part of construction project management consist of manually collecting and documenting field information and then digitizing it. Through this procedure, those responsible for implementing reports dedicate between 28% and 41% of the time per day to preparing them [5]. The goal of an automated monitoring system is to acquire data, convert it into information and deliver that information on time in relation to better project performance. In our approach we focus on activities as the main entities in the building information loop, which includes activity plans (table plan, 3D model) [6], on site activity progress and activity reports.

RESULTS AND DISCUSSION

Our research proposes an automated BIM model generation framework that can shorten the BIM process in construction projects by using 2D drawings-based design information. After confirming the current research status and related technologies, we suggest the process with applicable techniques from drawing recognition and to object-model generation. To evaluate the suggested framework, two kinds of experiments were conducted:

- ✓ *image processing*: With the recent remarkable development of computing technology, image processing can play an essential role as an automated monitoring tool. On the other hand, the image processing seriously depends on the quality of the photos, ambient light conditions, image noise, shadows, occlusions etc.
- ✓ *BIM:* BIM is a comprehensive methodology based on software that has the ability to compare the 3D geometry of all components by considering their descriptions and relationships [7]. In some operations, which require re-evaluation of themselves, as this leads to problems in construction operations, causes additional costs and corrections on site and over time, reducing the value of building quality and adjusting work schedules.

Analysis of the existing system for improving quality control in a construction organization and implementing organizational and technological solutions indicates that construction supervision methods do not fully reflect the new conditions and requirements of the company. When organizing construction production in a variety of urban areas, negative phenomena and various factors (economic, social, natural) affect the area of construction sites, which leads to a deterioration in the quality of construction [8]. All this leads to poor performance of construction and installation work, violations of technological regulations, shortcomings, commissioning capital construction projects in an unfinished state. At the same time, this causes the need for frequent operations, as well as additional financial and labor costs [9]. Modern conditions of a market economy impose competitive demands. When performing construction supervision, the performance of the works and the reliability of the estimated cost are controlled.

The analysis was carried out using the Revit program through the Generate As-Planned Model procedure. To mechanize the development progress observing. It is important to initially create a standard for the task execution called the as-arranged model. In computerized progress observing, the real advancement of work is contrasted against the as-arranged model with help chiefs to survey deviations from the as-arranged state and embrace restorative activities assuming the venture is behind the timetable.

In this exploration, the as-arranged model is delivered utilizing the Autodesk Revit programming and is connected to the venture plan term management consists of implementing the project in a specific period of time, corresponding to the so-called four-dimensional.

BIM is a methodology that needs software to use, without software there is no BIM, but BIM is not software [10]. The software used in 4D creates connections between 3D objects in the model, presenting project schedule tasks as a Gantt chart.

The developed methodology comprises the following phases:

- ✓ Modeling: The building model and the process schedule is modelled and combined in a 4D model in the design and planning phase.
- ✓ Monitoring by image: During construction, the site is continuously monitored by capturing images of the as-built state.
- ✓ Comparing: These are processed to create point clouds which are compared to the as-planned building model (as-built – as-planned comparison). Process and spatial information can help to further improve the detection algorithms. The generation of the point cloud consists of four steps: data acquisition, orientation of the images, image matching and co-registration.

CONCLUSION

Traditional monitoring process which consists of manually collecting information is slow and inefficient because the information is scattered in different documents, so the data can be deleted, causing no corrective action to be taken in time. Likewise, the construction sector uses very few technological resources and thus there is no automated process, which makes its difficulties to monitor construction projects in an efficient manner. This paper tries to identify the improvement of control procedures through the use of a data acquisition tool to reduce the working hours used in advanced control. With the implementation of this method, the hours spent by employees involved in managing the project have been reduced.

Automated progress monitoring enables decision makers to assess the deviations from the as-planned state and adopt corrective actions if the project is behind schedule.

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