

A Study of BIM(Building Information Modelling) based Building Maintenance Methodology

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ABSTRACT

On the building maintenance, Repair cycle information management is very important to building maintenance plan, and needed to set up repair cost and repair time based on repair standard and service lifetime. However, information management is incorrectly performed. There is no correct data about repair standard. All components tend not to deteriorate at the same time. Using BIM building maintenance system can manage components effectively and determine repair plan for building maintenance. This paper suggests the BIM using method for building maintenance plan and the repair standards. BIM ensure repair cycle through components' property set up. Furthermore BIM is able to evaluate different repair cycles using particular data input and could be the efficient tool for quantity take off and cost estimation. On the maintenance process, visualization is very useful function for communication. Building maintenance plan could be more efficient with using BIM based on component information.

KEYWORDS: BIM, Building Maintenance, BIM Maintenance System, Component information

1. INTRODUCTION

The goal of the world construction market has changed to reduction of environmental load recently. The necessity of investment on building maintenance for making the existing building utilized for a long time is increasing with the goal of reduction in treatment of construction waste and environmental load. Especially, these requirements are being legitimately enforced in projects of a public sector. Accordingly, construction companies are suggesting maintenance plans in order to satisfy client's requirements. But the objective basis on the maintenance plans is not sufficient. In order to overcome these problems, the maintenance plans based on objective data are necessary to be set up.

Moreover, as the system of each component becomes complicated in the contemporary buildings, a numerous number of maintenance targets exist regarding one member. The construction of a Database is being required for management of the complicated system like this.

On the other hand, the BIM (Building Information Modelling) is being actively introduced so as to raise efficiency for the whole construction industry. It can be said that BIM is a process for integrally managing information being generated for life cycle of a building from plan, design, construction, maintenance to demolition phase.

It is viewed that the problem of maintenance mentioned above can be improved through BIM. The BIM manages each component's information and makes the management more efficiently through an updating process of the information so that the repair action can be executed in a proper period.

There have been a number of studies concerning on this issue, such as Lee Ghang et al. (2006), Park, Jaehyun et al. (2008), Chang, Junghee et al. (2006), Yu, Seokjun et al. (2007). These performed on studies on Building maintenance information and BIM building maintenance. Although previous studies have valuable information on the maintenance information management system, these hadn't addressed relation between BIM information system and building maintenance information. But these literatures aren't clarifying a method for linking BIM to the maintenance information.

The purpose of this paper is to propose a maintenance plan methodology using BIM.

2. RESEARCH METHODOLOGY

The present research limits a list of maintenance's information and a method of BIM utilization as arrange of research. The necessary information of maintenance is collected through the existing research literatures. The present research aims to re-establish a standard of maintenance using BIM by analyzing collected information and to propose a utilization method of BIM that manages maintenance information.

3. MAINTENANCE INFORMATION

In general, the building maintenance is classified into an inspection stage and a repair stage. The inspection stage is divided into a usual inspection, periodic inspection and special inspection, and the repair stage is divided into a general repair, planned repair and special repair. The information on an inspection period and a repair period is basically added according to this classification.

There is a classification according to a part. In this case, it is classified into architecture, structure and MEP. The information such as repair method, repair cycle, repair stage (preventive maintenance, breakdown maintenance), repair cost, endurance period, maintenance manager (insourcing, outsourcing) is necessary as information being inputted according to a part. Especially, the repair period is segmented into complete exchange and a partial repair.

The classification of business is also an important part in maintenance. The organization, a target and corresponding business can be judged through business classification. The classification of business is classified into operational management and technological management.

4. BIM TECHNOLOGY

The function of BIM has a big meaning in a point that the information included in modelling can be variously utilized.

(1) Data-Base Construction

The BIM plays a role of constructing a Database that can systematically manage information included in modelling. BIM can easily exchange information through a Database systematically equipped, and can renew changing information without duplication. It can also extract required information or filter it.

(2) Quantity Take-off

As the BIM can input information according to each object and sort information according to a condition, it can calculate net quantity and confirm costs based on this.

(3) Analyzing Function

It is possible to analyze a target through information inputted to BIM.

This analysis is possible to automatically calculate through input of conditions. The structural analysis and environmental analysis, etc. are included as a content corresponding to this.

(4) Simulation

If time information is included in the results of three-dimensional modelling, setting of the order is possible. The order of all processes can be decided through this, and MIB is providing simulation function previously confirming procedures between processes.

5. BIM BASED BUILDING MAINTENANCE METHODOLOGY

The procedure of maintenance utilizing BIM includes a procedure in business performance and a procedure in decision-making and management of Database & information according to it.

The main content of the procedure of maintenance utilizing BIM is Database needing for business flow and is to do decision-making on the basis of this.

The procedure of maintenance utilizing BIM is to judge repair parts by utilizing inspection work and component information based on the established maintenance plan, and to decide its repair according to a repair part and a level of defects. If execution of repair work is decided, BIM visualizes a level of deterioration and simulates how the execution of repair work becomes. After the expenses are judged with repair company, its repair works get to execute after deciding a proper project performer.

The procedure in Database and information management is to renew Database after executing inspection and repair work and to change the repair plan though this. The management procedure is to perform corresponding work based on the existing information and to renew information according to its performance result. The most basic information is inspection request information of users and information of a maintenance plan. The defect existence is judged after inspection based on this, and then information is collected. If the collected defect information is inputted into a Database, repair information is renewed. The maintenance work progresses based on the renewed repair information, and if the result is inputted into repair information, inspection information is renewed.

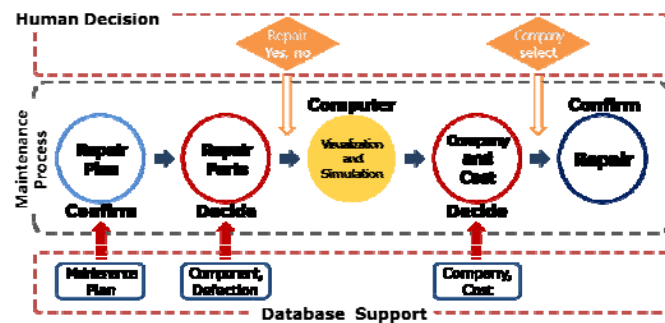


Figure 1. Process of Maintenance using BIM



Figure 2. Information management process

6. CONCLUSIONS

The proposal utilizing BIM was made to overcome difficulties in components managing in case of a Building maintenance plan. The content of information being used in BIM is generally information necessary for a maintenance plan, and it is important to renew it. The utilization method was proposed by utilizing information and function of BIM.

The procedure in maintenance is decided by referring a Database of inputted information. The Database should continuously update the change of a repair plan by utilizing BIM and rapidly cope with maintenance work. Additionally, through this updating work, the repair plan can be simulated by inputting repair time information. If simulation is carried out, the maintenance plan can be carried out based on a more objective and realistic basis.

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