

# Integration of Building Information Modelling in Facilities Management

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## Aim of the Project

- Investigate the uses of BIM that can be applied to the role of a facilities manager.
- Distribute survey to discover the knowledge that companies have about the uses of BIM
- Testing the integration of BIM software to determine the ease that it can be applied and used

## Background

BIM at its base level is a large information storage system that allows for any person working in the construction, design, or maintenance of a building to access important information such as the location of equipment, pipework in the building or control panels for fire alarm systems. This information is critical for proper installation and maintenance. There is also information such as equipment power consumption, recommended equipment check intervals, operation manuals, and for the building itself the U-Values of the walls (which is a value used to determine how much heat the building will maintain) which can be very beneficial for the company or residents. This information can be used to reduce the energy costs or organise for repairs without disruption to day-to-day activities. BIM can also be used from the initial concept of a building plan, before construction begins, to calculate the costs of the construction materials and labour hours. This is done by using the schedule feature within Revit. For an example, if a building requires a brick wall. This is done by taking the area of the wall, working out how many bricks are required for the area of wall, the labour time it takes to place one brick, the cost of each brick, and the cost of the labour hours. By using this feature properly, the entire building construction can be calculated accurately within the BIM model. This can be used by the construction team making it as an active building planning tool. This tool is best used at the beginning of a construction phase or after initial building plans have been created. After the construction of a building this tool can be used for extensions as well.

## Case Study

Section 1 of the survey contained a Yes or No question that would divide the participants between the remaining 2 sections. From the eleven responses there was close to an even split between people using BIM as a part of their job and people who do not. For research purposes this is the ideal outcome from a question like this. There is one extra Yes answer than No indicating that majority of the participants are within the targeted areas for this survey.

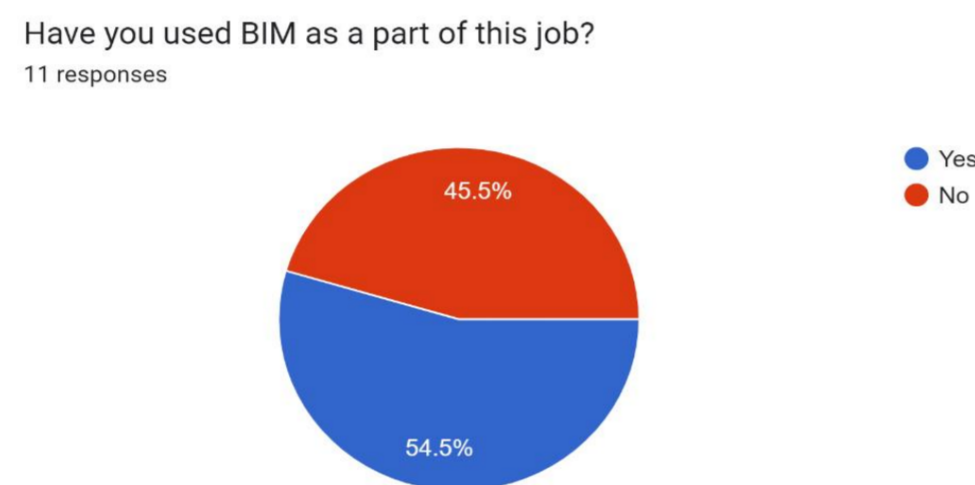


Figure 1: Results of Survey Question in Section 1

Participants that answered Yes to the question above were asked about the experience they had with BIM. The total years of experience from the participants was approximately 30 years making their knowledge and opinions reliable. Many responses from the participants to the question above described using BIM for the 3D modelling capabilities however, some did mention the use of clash detection in the modelling of buildings. 83% of the respondents also stated that they would certainly recommend other companies integrate BIM into their operations and buildings.

From section 3 (the participants that answered No) there was clearly no need for a 3D modelling software as the companies were not involved with the modelling roles. 2 response did state that they use either a building management system or a 2D modelling process to generate full 3D models. The latter response was from the same person who then stated that the company is changing its methods to adopt the use of BIM to improve their process. Majority of the respondents said that if their company was to adopt BIM and organise training on how to use it they would participate showing an interest in what BIM provides.

## Modelling

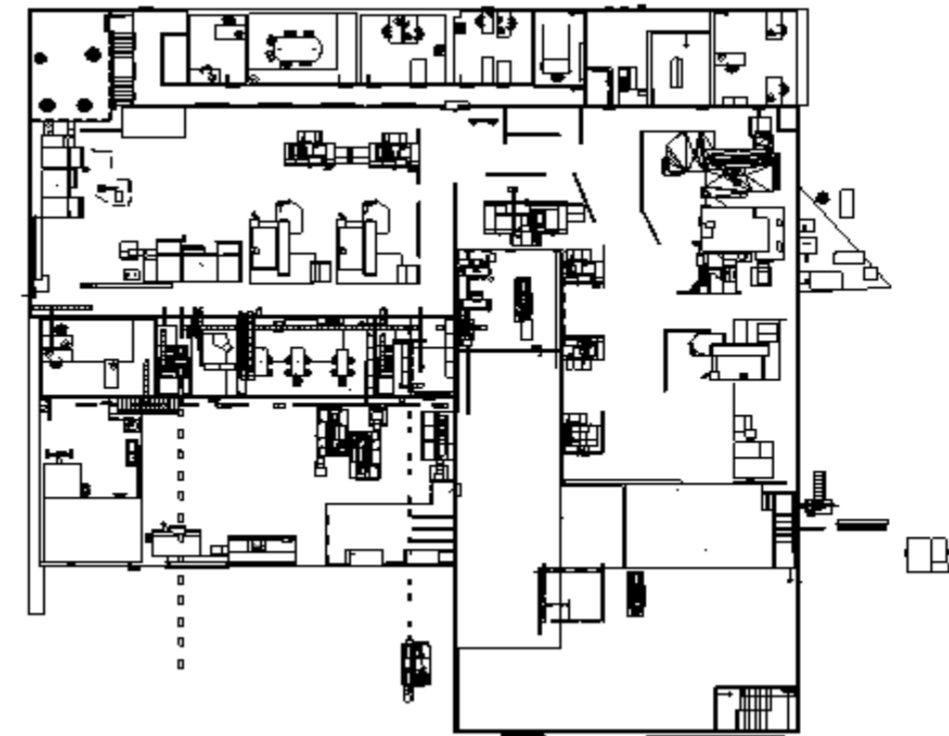


Figure 1: Ground Plan from SketchUp Model

The modelling of the building was carried out using Revit software and a SketchUp model that was provided by Takumi of their facility. The SketchUp model was used as a blueprint for the main model. There is some differences between the SketchUp model and the real building that had to be changed but much of the ground floor plan was very similar. The measurements of the building were also gathered from the SketchUp model to save time and keep consistency between the two models. Issues arose with the use of the SketchUp model as it was overly detailed when changed to a Revit model as seen below. These issues were resolved but caused a delay to the overall completion of the dissertation.



Figure 1: 3D View of SketchUp Model

## Conclusion

From the analysis carried out on the BIM model there is a calculated value for the estimated heating requirement for the spacing present in the building. These values as it stands will be inaccurate as the required information is not fully defined. Without fully defined data, estimations have been conducted by Revit. The estimations have been gathered from the location that was input for the building in the BIM model. The location for the BIM model was set as the actual location of the Takumi facility. Therefore, the solar gains estimations will be very accurate due to Revit being able to calculate the amount of sunlight that will enter through the windows of the Facility

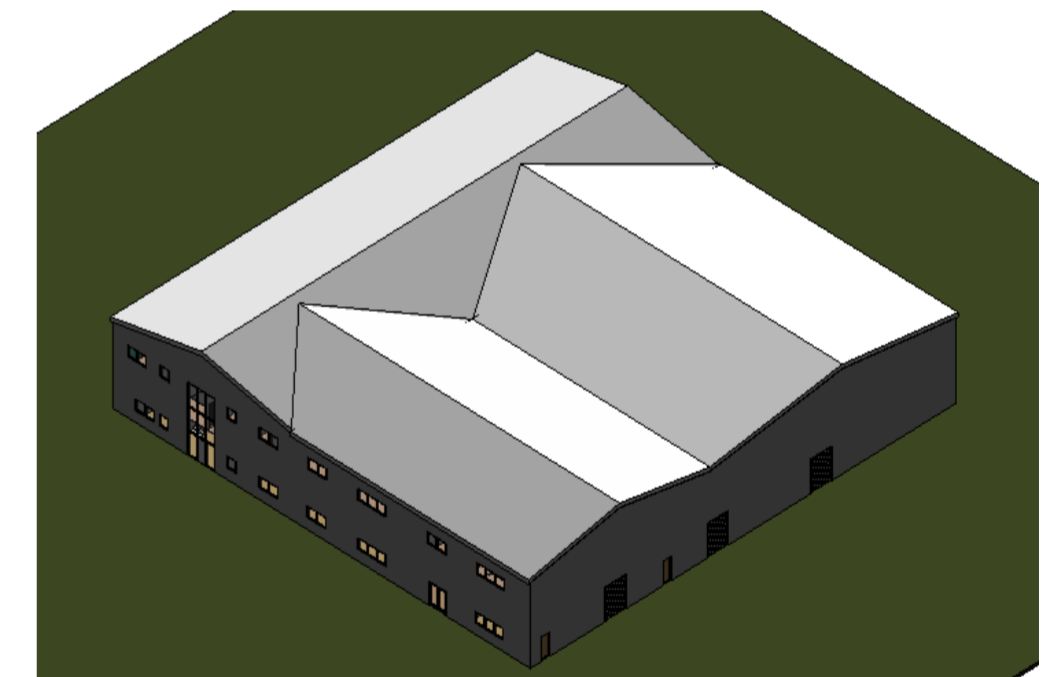


Figure 1: 3D View of Revit Model

This will reduce the amount of heating that is required from the building system. During the summer months when there is more sunlight and therefore more solar heat gains the estimated heating requirement is much lower than during the winter months. For all building types, the highest contributors to energy requirement is heating and lighting. This is no different in the Takumi facility even though the heating of the larger spaces is carried out by a separate electrical heating system. It should be noted that even with the proper inputting of the heating systems in place there will likely be an overestimation of the amount of heating being produced by these systems. This will be due to the heat that the workshop machines produce during operation. The amount of heat being produced by the machines will be a contribution to the internal temperature that will not be taken account of in the Revit estimations.