Modelling A Conceptual Mass Using BIM (REVIT Architecture)

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Abstract

Autodesk REVIT software gives the overall view of the construction. Built for Building Information Modeling (BIM), Autodesk Revit Architecture helps to capture and analyze design concepts, and more accurately maintain your vision through design, documentation, and construction. Use the information-rich models that Autodesk Revit Architecture provides to make more informed design decisions to support sustainable design, clash detection, construction planning, and fabrication Autodesk REVIT-2014 features a state-of the-art user interface, visualization tools, powerful analysis and design engines with advanced finite element and dynamic analysis capabilities. From model generation, analysis and design to visualization and result verification. In this paper, it gives a clear design and modeling of a residential building with the efficient structural and architectural plans. It provides the overall knowledge of material take off and schedule/quantities in the model of the building defined in the project. 3 D realistic view enables us to indicate the family and the components placed within the building model.

1.   Introduction

The Revit platform for building information modeling is a design and documentation system that supports the design, drawings, and schedules required for a building project. Building information modeling (BIM) delivers information about project design, scope, quantities, and phases when you need it. In the Revit model, every drawing sheet, 2D and 3D view, and schedule is a presentation of information from the same underlying building model database. As you work in drawing and schedule views. Revit Architecture collects information about the building project and coordinates this information across all other representations of the project. The Revit parametric change engine automatically coordinates changes made anywhere in model views, drawing sheets, schedules, sections, and plans.

1.2. BIM:

Building information modeling is a process supported by various tools, technologies and contracts involving the generation and management of digital representations of physical and functional characteristics of places. Building information models (BIMs) are files (often but not always in proprietary formats and containing proprietary data) which can be extracted, exchanged or networked to support decision-making regarding a built asset. Current BIM software is used by individuals, businesses and government agencies who plan, design, construct, operate and maintain diverse physical infrastructures, such as water, refuse, electricity, gas, communication utilities, roads, railways, bridges, ports and tunnels.

1.3. Mass modeling:

Mass modelingcontributes to the conceptual design process by allowing the architect to create a design that promotes the endeavors of its occupants while also eliciting an emotional response in both the interior and exterior environment.

During the early planning stages of a building project, you can analyze the conceptual design in several ways and for various purposes.

For example, you can perform the following types of analysis:

• The best mix of uses (such as retail, residential, and office space) for the building

• Rough cost estimates for the exterior of the building, based on linear dimensions or surface area

• HVAC (heating-ventilation-air conditioning) requirements for different levels of the building

To perform these types of analysis, you use mass floors to divide a mass based on defined levels. For each mass floor, the software calculates the floor area, exterior surface area, volume, and perimeter. This information is stored in the instance properties for mass floors. You can include these values in schedules and tags.
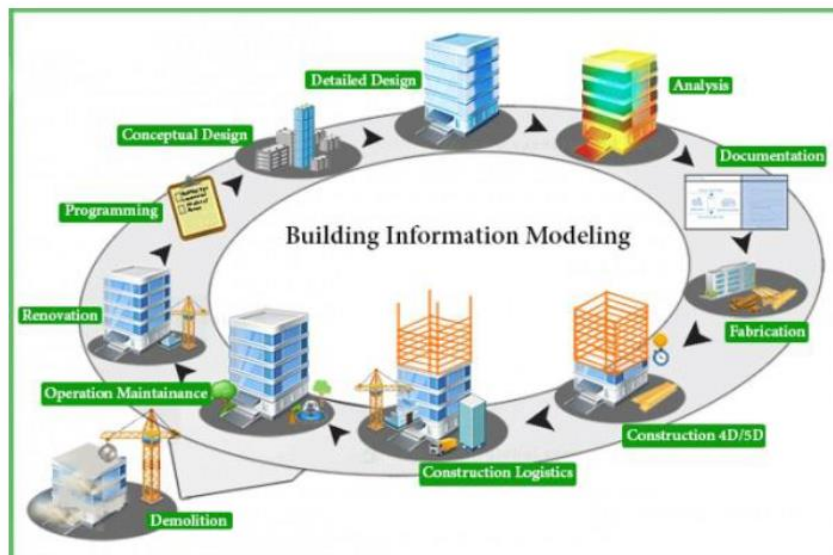
Fig.1 BIM

2. Literature Review

Structural analysis and design software based on the finite element method. It is capable of analysing and designing civil engineering structures such as buildings, bridges, plane and space trusses. It can generate loads (wind and earthquake) as per building codes of selected countries. It can carry out design of steel and reinforced concrete buildings as per codes of selected countries. It can carry out linear elastic (static and dynamic) and nonlinear dynamic analysis (although i am not sure how good the nonlinear analysis algorithms are, not having used those features). It has a simple and easy to learn user interface. It is currently developed by bentley systems inc. It was originally developed by research engineers inc. In California. It was one of the earliest structural analysis and design software with a user-friendly gui and support for building codes of countries other than us, uk, and other developed countries.

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REVIT ARCHITECTURE:

Building Information Modelling (BIM) is an intelligent 3D model-based process that gives architecture, engineering, and construction (AEC) professionals the insight and tools to plan more efficiently, design, construct, and manage buildings and infrastructure. There is still a place for CAD software like AutoCAD, which designers still use for detailing and documenting we can import Revit model into STAAD. Pro by using the ISM format. To transfer Revit model into STAAD.Pro with ISM you will need to install two programs. Structural Synchronizer is the engine that makes ISM work, and the ISM Revit Plug-in that adds the commands to the Revit menu

The Revit work environment allows users to manipulate whole buildings or assemblies (in the project environment) or individual 3D shapes (in the family editor environment). Modelling tools can be used with pre-made solid objects or imported geometric models. However, Revit is not a NURBS modeller and lacks the ability to manipulate an object's individual polygons except on some specific object types such as roofs, slabs and terrain or in the massing environment

Revit can be used as a very powerful collaboration tool between different disciplines in the building design sphere. The different disciplines that use Revit approach the program from unique perspectives. Each of these perspectives is focused on completing that discipline's task. Companies that adopt the software first examine the existing workflow process to determine if such an elaborate collaboration tool is required.

When a user creates a building, model, or any other kind of object in Revit, they may use Revit's rendering engine to make a more realistic image of what is otherwise a very diagrammatic model. This is accomplished by either using the premade model, wall, floor, etc., tools, or making her or his own models, walls, materials, etc. Revit 2010 comes with a plethora of predefined materials, each of which can be modified to the user's desires increase when increase in input motion. The reduction factor decreases he of earthquake

3.   Proposed System

When you export an image, Revit LT prints any view directly to a raster image file. You can then use this image for online presentations or printed materials.

1. Click File tab ExportImages and Animations (Image).

2. In the Export Image dialog, click Change to change the default path and file name for the image, if desired.

3. Under Export Range, indicate the images to export: • Current window. This option exports the entire contents of the drawing area, including parts that are outside the current viewing area.

• Visible portion of current window. This option exports whatever is currently visible in the drawing area.

• Selected views/sheets. This option exports the specified sheets and views. Click Select. In the View/Sheet Set dialog, select the views and sheets to export, and click OK.

Under Image Size, specify image display properties: • To specify a print size and orientation for the image, select Fit To and enter a pixel value. For Direction, select Horizontal or Vertical. Revit LT fits the image horizontally or vertically into the specified number of pixels. • To magnify or reduce the image, select Zoom To and enter a percentage. Revit LT prints the image at the specified zoom setting.

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Under Options, select the desired print options: • By default, links in the exported image display in black. To display blue links, select View Links in Blue.

• To hide unwanted parts of the drawing in the exported view, select any of the following: Hide Ref/Work Planes, Hide Scope Boxes, Hide Crop Boundaries, and Hide Unreferenced View Tags.

Under Format, select an output format for shaded views and non-shaded views. If you specified a Zoom To percentage for Image Size, select a DPI (dots per inch) value for Raster Image Quality.

Click OK.

The selected sheets or views are exported as images in the specified file.

Rendering:

Render the view to create a photorealistic image of the 3D model.

Before starting the render process, see Best Practices: Rendering for information about how you can improve performance.

After preparing the 3D view and using the Rendering dialog to select desired settings, click Render to render the image.

Revit begins the rendering process, rendering the entire image progressively. Revit displays a progress dialog, which shows information about the rendering process.

Due to the copyright nature of project work, it is rare and impractical to be able to buy fully 3D modelled Revit project models. Indeed, as most projects are site specific and bespoke, obtaining an existing model is in many instances unsuitable. However, there are circumstances where new practices or students that are training to learn Revit, do have a need to refer to completed models. Sources for these are limited, however they can be purchased at websites like BIM Gallery and downloaded from websites like GRADCAD.

Although Revit software comes with a range of families out of the box (OOTB), they are limited, so users can find a need to build their own families or buy them from online stores such as PLANSORT, BIMBANDIT or ANDEKAN. A number of websites offer families for free including Revit City, AUGI, BIMOBJECT, BIMSMITH, National Bim Library and BIM&CO
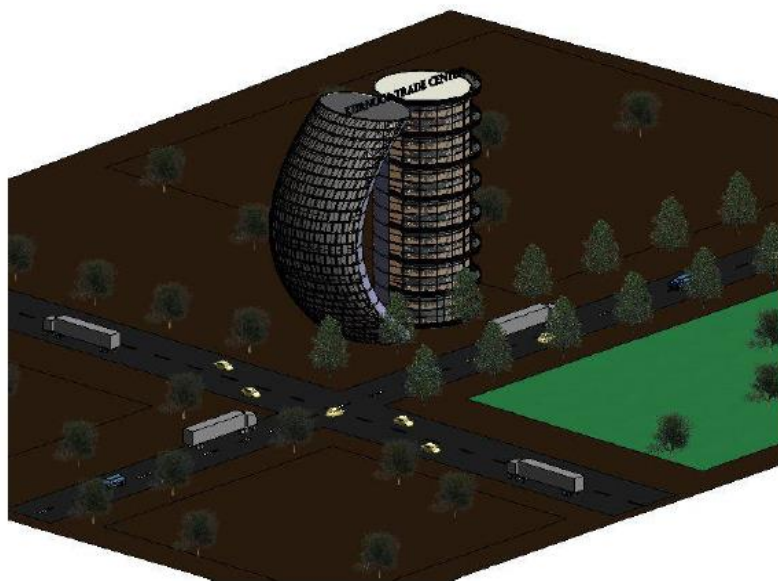
Fig.3 Proposed Rendering

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4. Conclusion

An architectural project will begin with a conceptual study of shape, form, and size. It is so crucial to get these three elements of the proposed structure right in the very beginning, that no amount of architectural detailing or facade materials can compensate for a building that is out of proportion or one that appears awkward within the surrounding landscape or environment. When massing is properly modeled, the aesthetics, the form, and the function of interior and exterior spaces will harmonize. Prior to computer-aided architectural design (CAAD) technology, architects used either wooden blocks or moldable clay to model the shapes, forms and inter-relationships of the building to achieve a clinical description of volumes. Today, using Auto desk Revit Conceptual Massing tools, a conceptual mass model can be further developed by converting or mapping the mass surfaces into real world architectural elements such as walls, floors, facades, and roofs. Mass modeling goes beyond determining if a building should be short or tall, long or wide. A true mass model can also guide the architect in selecting the best orientation of the building and in determining the design and location of openings to maximize solar shading options and minimize HVAC loads. A successful massing and orientation will allow the structure to take full advantage of site conditions and environmental conditions.

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