

# Using BIM to Improve Design and Construction of Structural Project

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parts for conflicts (clash detection) to ensure everything will come together seamlessly, and all this while you can still use an

“eraser,” rather than having to rework later in the field.

*Abstract--- Building Information Modeling (BIM) is a collaborative way of working, underpinned by the digital technologies which unlock more efficient methods of designing, creating and maintaining our assets. BIM embeds key product and asset data and a 3 dimensional computer model that can be used for effective management of information throughout a project lifecycle – from earliest concept through to operation. It has been described as a game-changing and cultural process for the construction sector. A number of countries globally are starting to realise the opportunities it brings and are now investing in developing their own capability. BIM processes are ‘mainstream’ to both new buildings/infrastructure and have further potential in ‘retrofit’ and ‘refurbishment’ projects when complementary workflows such as laser scanning and rapid energy analysis are employed. BIM technology should be seen as a*

*‘collaboration’ between the construction sector and the software industry.*

*Keywords--- BIM Building Information Modeling, BIM software*

You can also use this 3-D building model to analyze the designed building’s energy efficiency by running scenarios to determine the best of several potential solutions. In addition, depending on the detail of the model, you can automatically take off all items contained in the model and that way produce an impressively precise estimate.

The software and database management technology exists today to accomplish exactly this. What has yet to be realized and

## I. INTRODUCTION

Building Information Modeling (BIM) allows you to fully and truly construct a building virtually, and in detail.

During the BIM-design phase you can not only select and place the materials that will make up the finished structure including concrete slabs, rebar, steel structure, wall and ceiling components, HVAC, plumbing and electrical but you can also test all such

bought in to by a large majority of our industry, however, is the collaboration and coordination between the various construction disciplines that BIM calls for.

Not only the owners and architects, but engineers, contractors and, ideally, subcontractors as well, need to be involved in the project from the outset; in other words, during the design of the building. This, of course, invariably means some form of design-build rather than the currently prevailing design-bid-build process.

BIM is not just the latest release of CAD software; it is an entirely new way of looking at the design and construction of a building.

BIM solving both design and construction problems while also providing a complete as-built 3-D building model as a property management facility upon completion of the project.

## II. BIM

The 3-D images of BIM are no longer surface-only shapes. They are objects. They are objects with content. The wall contains studs at indicated intervals; it contains wallboard of a certain thickness. The concrete slab contains rebar to increase tensile strength. The windows are double glazed (or not).

If all database fields (parameters) pertaining to a given object are correctly populated, you can find out everything you need to know about any given item, including, among other things, its position and relation to other items, its R-value, its manufacturer, its cost, its place of manufacture, its use of

recycled material, and its delivery time even its installation instructions.

You can look at a true (meaning all pertinent information is accurately entered) BIM rendering and know as much about what you are looking at as if you were looking at the real thing, in real time. And you can understand the BIM 3-D model so much better than a 2-D drawing, because you see it as it is supposed to look.

BIM has many other strengths, but this one is key: BIM truly facilitates communication and understanding.

BIM facilitates communication between the owner and the designer and between the designer and the contractor, who now sees how it all goes together, and who can be assured through clash detection that there will be no conflicts; and between the contractor and the subcontractor, who also gains a much better understanding of what, exactly, is to be done from the clear visual that BIM offers.

## III. BIM SOFTWARE

### *Autodesk/Revit*

By all accounts this is the most widely used of the BIM tools, primarily since Autodesk's AutoCAD has for several years now more or less ruled the auto-2-D drawing market and Revit Architecture appears to be a natural extension of that which it actually is not.

Revit was originally a startup, acquired by Autodesk and introduced as Autodesk Revit in 2002. Revit's platform is completely separate from AutoCAD, both as to code and file structure.

### *Bentley Systems*

Bentley Architecture, introduced in 2004, was an evolution of its earlier platform, TriForma. Several other Bentley modules integrate well with Bentley Architecture:

- Bentley Structural.
- Bentley Building Mechanical system
- Bentley Building Electrical Systems.
- Bentley Facilities.
- Bentley Power Civil.
- Bentley Generative Components.

With these modules, Bentley addresses almost all aspects of the AEC industry.

### *Vico*

While Vico is a new company, its BIM engine is based on the almost venerable Graphisoft ArchiCAD. Graphisoft sold ArchiCAD to a German software developer in 2007, while it at the same time spun off the ArchiCAD-based construction suite to Vico software, a new company focusing on the design and construction industry.

The engine, ArchiCAD, has been a solid modeler since the mid-1980s, and is now a very stable platform.

Other modules in this suite include project management, Estimator, and Project Control, which is a scheduling software.

### *Tekla*

Tekla is a Finnish software house founded in 1966 that specializes in structural steel, steel reinforcing in concrete, and precast concrete

modeling. In this area, the software is capable of taking a design all the way from concept, through design and structure analysis, through detailing, all the way into production and assembly. Therefore, you can use the same model created at the outset of the project for prefabrication output.

### IV. BIM 2020

By the year 2020 BIM will most likely have reached all the way into the building codes structure and the permits process. "Send me the model" may well be the immediate response to a permit request. More likely model is to code, and you may receive your permit in minutes, rather than weeks, after submittal.

Lean Construction principles will have worked their way into a majority of projects, and the U.S. construction industry will, as a team-centric industry, be the most productive and the most proud in the world. It does not take a crystal ball, or even 20/20 vision, to see that.

### V. CONCLUSION

BIM is complete solution for ACE industry which provided high efficiency of information which gives better co-ordination, communication and understanding resulting economical, error free and quality structure in less time.

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