



Introduction to Building Information Modeling

An Online Continuing Education Course for Engineers

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Introduction to Building Information Modeling (BIM)

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Waste and inefficiency are two major problems in the Architectural, Engineering, and Construction (AEC) industry, and are largely caused due to rework caused by:

- a. Design errors
- b. Incomplete design information
- c. Poorly coordinated drawings
- d. Inability to use design data for shop drawings
- e. Inaccurate quantity and bill of material
- f. Field rework
- g. Poor subcontractor workflow – “Starts and Stops”

The rework costs millions in change orders and is fundamentally unsustainable in both environmental and economic terms.

Building Information Modeling (BIM) is a new way of approaching the design, construction, and management of a building. The American Institute of Architects has defined BIM as “a model-based technology linked with a database of project information.” The project information can be exchanged and accessed by architects, engineers, contractors, and any other stakeholder at any time. By doing this, the communication gap is bridged, and many errors are eliminated in the process.

The main benefits of BIM are:

- Greater accuracy in design
- Improved communication
- Improved collaboration
- Higher quality project decision making
- More comprehensive planning and scheduling
- Less wasted materials and rework—no job hours wasted on a job site

- Fewer interferences/interruptions to workflow which allows everyone to be more productive
- Conflicts are resolved with less wasted time—check the model
- Fewer change orders
- Better trade coordination and sequencing—less congestion of trades
- Safer job—less clutter, fewer lifts, less congestion
- Eliminates rework, as builds are based on the actual installation
- Increased labor productivity, thereby lowering construction costs

The data-driven BIM systems save time, effort, and money while ensuring complete handover of design information from the design team to the contractor and then as-built information from the contractor to the owner.

This course defines what BIM actually is and discusses the benefits and challenges that are associated with the design and construction of building projects. The course is useful information for building industry practitioners considering implementing BIM technology in their projects.

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Chapter 1

Introduction to Building Information Modeling (BIM)

1.0. BIM

BIM stands for “Building Information Modeling.”

BIM is very simply a model-based technology linked with a database of project information.

This allows an integrated approach in which architects, consultants, engineers, contractors, and owners can obtain a clearer vision of the overall project.

A basic premise of BIM is a collaboration by different stakeholders to eliminate waste, reduce errors, and increase efficiency during building design and construction. Since all information is in digital form, the BIM process involves all design team members (owner, architect, engineer, contractor, subcontractors, suppliers and facilities management, etc.) to collaborate and contribute. As the model is being created, team members are constantly refining and adjusting their portions according to project specifications and design changes to ensure the model is as accurate as possible before the project physically breaks ground.

1.1 Key Facts

- a. The BIM concept creates a virtual model of the project before physical construction.
- b. It refers to a model-based technology linked with a database of project information and quality of the work. It is NOT a software application.
- c. It is a database of project information in a digital form. It stores the vast amounts of project information.
- d. BIM is all about a “data-based” environment.”

The key benefit of BIM is that it allows for the seamless sharing, transferring, and validation of project information throughout the life cycle of the project. It allows for the integration of project information. Changes to the model affect all related information, which reduces the chance of information loss that occurs when a new team takes ownership of a project or

