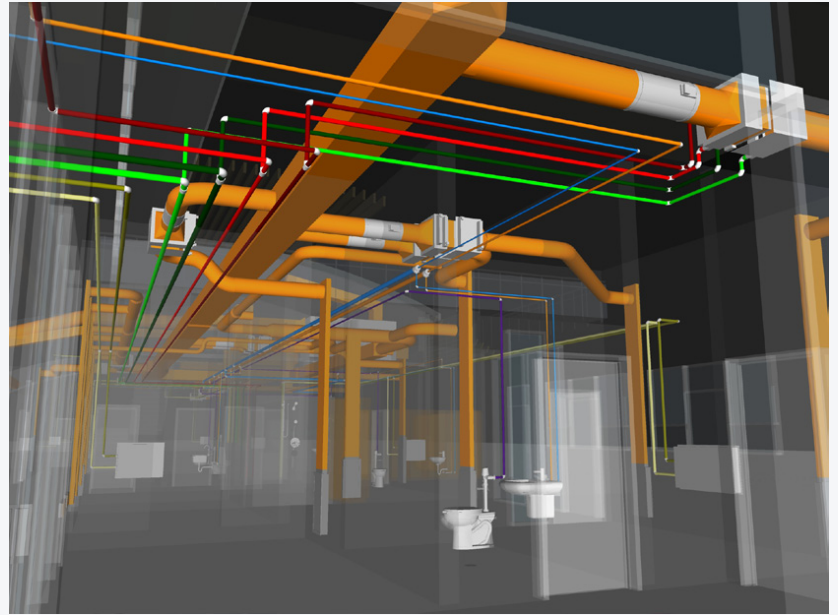


BIM FOR THE MECHANICAL BUILDING INDUSTRY

Rod Yeoh, P.Eng., P.E., LEED® AP - Principal
Omicron Architecture Engineering Construction Ltd.

Building Information Modeling (commonly referred to as BIM) far exceeds the more conventional geometry of 3D-CAD drafting. BIM is a valuable building design and construction methodology and process, characterized by the creation and use of coordinated, consistent and intelligent data about a building project during its design and construction and even into its operation. During the BIM process, intelligent building data is generated and managed and can be used throughout the life cycle of a building – in essence creating a virtual prototype of the building.

The extent of data-rich information contained within the model is the key to BIM since it enables analysis, simulation and visualization of the actual components being used to build a building. For example, instead of a rectangle on a page to represent a boiler, the boiler in a Building Information Model is actually a boiler, with correct geometry and parameters attached to it, such as gas input, heating output, weight and electrical data. This enhanced level of detail throughout the design, construction and eventual operation of a given facility represents a substantial shift from the more traditional computer-aided drafting methods and greatly improves the overall flow of critical information between the design team, construction team and builder owner/operator.



In my experience, one of the main challenges of adopting BIM is the design and construction industry's conventional design-bid-build sequential delivery process. The use of BIM requires all stakeholders to participate earlier in the process which is difficult in a traditional delivery process. For the benefits of BIM to be fully realized, an Integrated Project Delivery (IPD) method is required. IPD is a vital component to true BIM since it commands early collaboration of owners, architects, engineers, contractors and even trade contractors.

Another challenge is the current ability of trade contractors to work in a BIM environment. While many trades can use and/or generate 3D drawings key information is missing from their current models. Furthermore, the interoperability of the different modeling packages is an issue. It is also currently difficult to find truly BIM capable staff. In a BIM workflow, the people building the models must understand how the building is actually going to be built, as they are building it virtually before it is built in the field.

Although the availability of mechanical and electrical content for BIM models is improving, it is nevertheless several years behind its architectural equivalents and the complexity and amount of detail in content currently available produces much larger, and therefore slower, model files.



Rod Yeoh is a Principal with Omicron Architecture Engineering Construction Ltd. Rod leads the Mechanical Engineering Discipline and is also in charge of implementing Building Information Modeling throughout Omicron's operations.

Omicron is a privately-held Canadian integrated architecture, interior design, engineering and construction firm providing total building solutions to clients in the institutional, commercial, retail, residential, oil and gas and renewal sectors. Since its inception in 1998, Omicron has quickly grown to become the largest integrated design and construction company in Western Canada with offices in Vancouver, Victoria and Calgary. Omicron is proud to have Requalified as one of Canada's 50 Best Managed Companies in 2010 after winning the Best Managed award in 2009.

Having utilized Revit Architecture building design software since 2003, Omicron implemented Revit MEP (mechanical engineering and plumbing) in 2008 as a comprehensive design solution for its in-house engineering professionals.

Of the many benefits of BIM, visualization, clash detection and coordination are among the most practical and easily achieved for mechanical engineers and contractors. Mechanical, electrical and plumbing (MEP) models, generally created separately from architectural and structural models, can be linked in for clash detection and coordination. Designing a 3D layout of complicated mechanical rooms, ductwork and piping that integrates seamlessly with architectural, structural and electrical components significantly reduces time spent in the field and in contract administration along with a reduction in Requests for Information (RFIs) and change orders. If designed properly, BIM could even be used to fabricate large sections of piping or ductwork. This can be done safely and efficiently in a shop as opposed to being installed piece-by-piece in the field.

For engineers, BIM tools can utilize the model's parametric data to generate and automatically update equipment schedules and technical specifications as well as providing a basis for valuable energy modeling. For contractors, effective BIM not only facilitates accurate quantity estimates but can also generate a bill of materials to aid costing, scheduling and just-in-time delivery of materials.

With extensive input from mechanical and electrical engineers and contractors, BIM can also be used for facility management. Facility managers can use a virtual model of the building in day-to-day operations.

The initial implementation of BIM might seem like a longer process when compared to more traditional methods, especially considering the higher degree of accuracy required for modeling mechanical and electrical components, but patience and perseverance are key and the downstream benefits are plenty. The initial increased effort will pay off many times over in downstream cost savings due to a reduction in RFIs, change orders, on-site coordination and construction time. The capacity to maintain a building, track and model its energy efficiencies and easily identify and investigate any equipment failures promotes significant savings in costs as well as manpower.

BIM is the way of the future for the design and construction industry. The extent of its success relies on the full support of senior management as well as buy-in from all levels of an organization as well as their clients and industry partners. Many government agencies and private sector owners are considering BIM as a prerequisite for their projects. Mechanical Engineers and Contractors need to get informed, get trained and be fully committed to this technology – or they risk being left behind.