

ENGINEERING

S Y S T E M S O L U T I O N S

In this issue of *Engineering System Solutions*, we provide a brief introduction to Building Information Modeling (BIM) – a growing trend in the architectural and construction industries.

BIM is emerging as an important design process that enhances productivity, helps control costs and supports the sustainability objectives of building projects. It essentially involves creating a virtual building model, complete with parametrically defined graphical and non-graphical information that allows the designer to understand and create functional relationships between elements. As changes are made to the model, these functional relationships and all other information related to the building project are automatically updated.

McQuay has been aggressively pursuing having the most comprehensive library of BIM object models and content for our HVAC products in support of our architect, MEP and contractor customers.

For more information on McQuay products and BIM capabilities, contact your local sales representative or visit www.mcquay.com.

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A Brief Introduction to Building Information Modeling (BIM)

A growing trend in the building industry incorporates more detailed data in a building design earlier in the overall design process. Building Information Modeling has emerged as an important building design process to satisfy this requirement.

For decades, architects, mechanical, electrical and plumbing (MEP) designers and contractors have used CAD-based libraries supplied by building product manufacturers, primarily for the geometric data that describe the product. As it applies to an HVAC system, this process is accurate in terms of geometry, but it is limiting in terms of the integration of that information among the building's structure and systems (walls, ceiling, floor, plumbing, electrical, etc.). This increases the risk that on-site design changes will be required – for example, re-routing piping or ductwork to avoid obstructions not detected in the original design – which can ultimately impact both the project timeline and building cost.

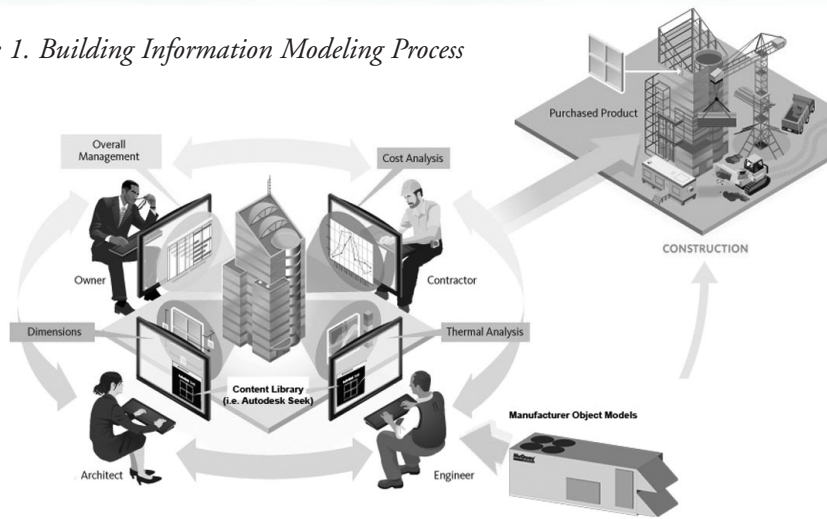
Also driving this trend is the increasing requirement for designers to provide more accurate energy modeling data in support of energy conservation incentives and/or sustainable building programs such as

LEED® certification. The ability to precisely lay out an HVAC system as it will be installed can be critical in providing the most accurate energy model for that system in that building.

What Is BIM?

BIM combines intelligent 2D and 3D objects comprising a building design, along with external factors such as geographic location and local design conditions, into a virtual building database that provides a single, integrated source for all information associated with that building. The “intelligence” attributed to the objects includes parametrically-defined graphical and non-graphical information, giving the architect, MEP user and the contractor the ability to represent geometric and functional relationships between building elements. This information feeds an integrated database, which in turn feeds all design documents and schedules for the building project. When a change is made to the building model, all graphical views (plan, elevation, detail, and other construction documents), as well as the design documents and schedules, automatically reflect the change.

Figure 1. Building Information Modeling Process



The Advantages Of BIM

Improved information flow –

Because a building information model represents a unified description of a building, it can significantly improve the flow of information in every stage of the design, construction and life-cycle of a building. The building information model can be accessed by the architect, MEP, contractor and owner at different phases in the building life cycle to add, extract or modify information in support of their role. A clear vision of the project is maintained to promote informed decisions, reduce errors and improve productivity.

Better design visualization – The ability to predict how occupants, visitors and neighbors will react to and interact with a building is a crucial part of the design process for architects and engineers. But the virtual building created using BIM also provides an important benefit in helping MEPs optimize the layout of the HVAC system within the space constraints of a building project. Whether fitting a chiller plant or air handler in a mechanical room, or routing piping or ductwork throughout the building, the ability to virtually build the HVAC system and visually examine it in 3D as it fits

within the virtual building can provide added assurance all components will fit when construction begins.

Improved cost estimating – It stands to reason that BIM can simplify and help improve the accuracy of cost estimates because of the depth and accuracy of the information it provides. The relative ease with which material and assembly quantities can be extracted can increase the speed and accuracy of estimates, providing a better gauge of the impact of design changes so that budget concerns can be dealt with proactively.

Improved energy analysis – Here again, the accuracy of BIM can serve to simplify and help improve the accuracy of energy analysis. While the computation of energy use requires additional software tools, the data required to perform such analysis is resident in the building information model.

Building history – As a building passes through design, construction and into occupancy, the building information model can serve as an important information library for owners and service contractors. For example, if a building component fails, the building information model

can be used to identify its location, manufacturer, model number, performance specifications and other pertinent data to most efficiently repair or replace that component. If a portion of the building is being remodeled, the building information model can be used to identify concealed components, such as piping, ductwork and electrical equipment to promote informed decisions on the remodel design.

BIM Software

Major Architectural, Engineering and Construction (AEC) software companies, such as Autodesk, Bentley, Graphisoft and Gehry Technologies provide the basic software package necessary to create a building information model. While the predominant users of these software packages are architects, their use is rapidly expanding among MEPs and contractors as more of the benefits of the technology are exposed and the market demands tighter control of the design process to achieve productivity, cost and sustainability goals. Software providers have responded by integrating technology to use the building information model for further analysis (i.e. energy analysis and facility management) to provide an increasingly more complete solution for the various disciplines involved in the buildings market.

Where Do The Object Models And Other Content Come From?

BIM relies upon 2D and 3D parametrically-defined object models to build the most accurate building information model. In many cases, these object models represent building components, such as HVAC equipment, and should ideally be provided by the manufacturer to provide the most accurate representation. While it is possible to use a generic object model as a

placeholder, the building information model will not be complete until the manufacturer's accurately-defined object model is included.

Manufacturer websites are a good source for finding object models and other content for BIM. However, given the number of components that comprise a building, and the number of manufacturers supplying those components, it can be overwhelming to manually search for object models on individual manufacturer websites. There are several web sites available that provide a library of object models and other content. Among the most

popular sites are Autodesk® Seek, BIMWorld or McGraw-Hill Sweets Network. The search capabilities on these websites can be very sophisticated and allow you to pinpoint object models and other content quickly.

Conclusion

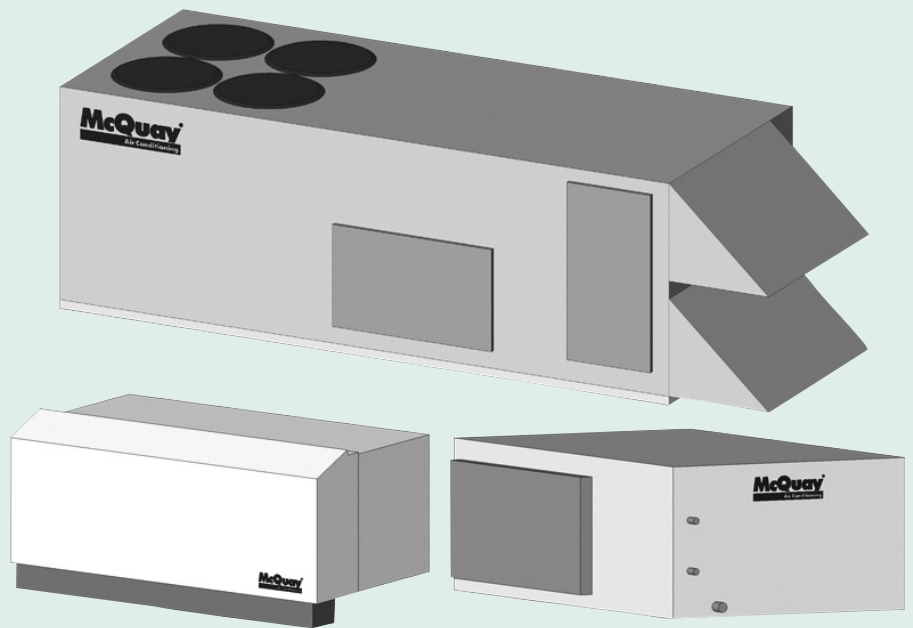
It is almost a foregone conclusion that the use and sophistication of BIM will continue to grow as more of the benefits of the technology become evident and the market demands tighter control of the design process to achieve productivity, cost and sustainability goals. The number of

buildings designed using the technology and the number of BIM users has grown almost exponentially over the past few years and this trend is expected to continue. If you are not already using BIM, you should consider getting involved. For more information on BIM, a good starting point might be the Whole Building Design Guide website (<http://www.wbdg.org/bim/bim.php>) or the websites of software providers. For more information on McQuay products and BIM capabilities, contact your local sales representative or visit www.mcquay.com.

McQuay Has BIM Object Models and Content Available Now!

McQuay has been aggressively pursuing having the most comprehensive library of BIM object models and content for our HVAC products in support of our architect, MEP and contractor customers using BIM technology. Our library of object models and content continues to grow and can be found on www.mcquay.com.

Due to the overwhelming percentage of requests for BIM content compatible with Autodesk® Revit® software, McQuay has created our first BIM content in Revit format and made it available on the Autodesk®



Seek web service. Autodesk Seek is among the leading providers of BIM object models and content, with advanced search capabilities that help you pinpoint the right object models for your BIM design project.

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