





BIM AND DAYLIGHTING

THE ULTIMATE PLANNING AND SUSTAINABILITY DUO

by Wes Brooker

Construction has become increasingly complex, with the need for more efficient buildings, tighter schedules and smaller budgets. It is imperative to constantly adapt to the ever-changing technologies that further enhance the construction industry.



The use of Building Information Modeling (BIM) software on-site and in the office helps streamline workflow, maintain more accurate information, and keep BIM construction projects moving forward more predictably. Now skylights are more than just a hole in your roof. Proper daylighting provides not only energy savings, but additional business and lifestyle improvements.

BIM is the process of generating and managing building data and its various components throughout the building's life cycle by using three dimensional, real-time, dynamic building modeling software to increase productivity in building design and construction.

Moving Toward the Conceptual Model

Unlike past 3D innovations in the building industry, BIM is more than a conceptual modeling tool. BIM encompasses building geometry, spatial relationships, geographic information, quantities and properties of building components. BIM has been one of the most important developments to hit



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the construction industry in decades and is essentially digitization of the construction process. No industry, including hand cartoon animation or film photography, has ever been the same after being digitized.

During the pre-construction phase BIM allows for a quick way to determine cost and schedule feasibility with various configurations to find the best value. The quality of the design is greatly improved and the visualization aspect allows key decisions to be made earlier in the process.

Comprehensive Life-Cycle Management

BIM is the choice of leading builders, architects, fabricators, erectors, engineers, designers, manufacturers and owners because it leads to increased productivity, provides comprehensive life-cycle management and enables communication across project team members, which can significantly reduce change order costs.

As the model incorporates all of the trades, it compels early coordination that detects clashes of the various systems that can save

Electric lights account for 40-50 percent of the total energy consumption in commercial buildings. Strategic daylighting can reduce total energy costs by as much as one-third because it uses sunlight, a resource that costs \$0 to produce, contributes zero greenhouse gases to the environment, performs at 100 percent on the Color Rendering Index, and will be around for another five billion years.

up to 10% of the construction cost due to reduced changes in the field. It is estimated more than two thirds of the construction industry is using BIM, but daylighting takes sustainability one step further.

The Brightest of Ideas

Daylighting: The controlled admission of natural sunlight into a building via diffused skylights or windows. Done correctly, it can

save energy and money by reducing the need for artificial electric lighting during daylight hours without causing heating or cooling problems.

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gases to the environment, performs at 100 percent on the Color Rendering Index, and will be around for another five billion years.

Lighting systems in nonresidential buildings operate at full output regardless of outdoor conditions. On most days, however, daylight (sunlight through skylights and windows) can provide sufficient light levels for most activities. Failing to dim electric lights can lead to occupant eye strain and unnecessarily high electricity use, both in overuse of the lighting and overuse of air-conditioning to eliminate the excess heat. Experience has shown that in commercial buildings, the manual operation of lights is unreliable and thus an automatic system is required.

As a result of daylighting, facilities continue to see improvement in areas other than just their energy bills. The bright and airy atmosphere created by daylights has been proven to increase grades, work performance, return on investment and sales.

Educational Benefits of Daylighting

In educational settings, daylighting has been shown to increase productivity and grades while reducing absenteeism. A study initiated by the Pacific Gas and Electric Company (PG&E) showed that students with the most daylighting in their classrooms progressed 20 percent faster on math tests and 26 percent

faster on reading tests in one year than those with the least. The study found a uniformly positive and statistically significant correlation between the presence of daylighting and better student test scores.

Higher Satisfaction and Productivity

Numerous studies link daylight and views of the outside to higher levels of satisfaction and productivity in the workplace. Businesses who utilize productivity-focused energy-efficiency measures view them as a distinct competitive advantage. The PG&E study showed that office workers in a daylit atmosphere had the following benefits: (1) Performed 10 to 25

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percent better on tests; (2) Improved recall; (3) Improved employee morale; (4) Showed more satisfaction with their work environment.

Looking To The Future

Building owners' manuals of the future will go digital with BIM as the most important component. One of the most valuable benefits of BIM technology is the ability to provide a digital owner's manual rather than thousands of pages of blue prints. The building owner gets

a digital copy of the completed project model that can be used for decades of operation and maintenance. Considering that 85 percent of the cost of a building over 30 years is in maintenance and operation, having a digital copy of the completed project that includes all information related to the building eases the task of ongoing maintenance.

Daylighting goes beyond cutting a hole in a roof, but requires an integrated approach to be successful. Effective daylighting requires

decisions about the building form, location, climate, building components and lighting controls. In return, properly daylit buildings can repay installation costs quickly—often in less than two years. Daylighting can be installed in buildings to replace electric lighting for 1/20 of the cost of enough solar PV panels to generate an equivalent amount of electricity using the same sun at the same high-energy-demand times of the day.

BIM and daylighting are the ultimate team in planning and sustainability. Working together, BIM and daylighting reduce total energy cost and enhance the building's life cycle for years to come.



ABOUT THE AUTHOR: Wes Brooker, Manager of Marketing at Nucor Fabricated Products, is responsible for corporate development and strategic growth programs for the company. His areas of expertise include marketing, business strategy, top line growth, green and sustainability programs and Building Information Modeling.



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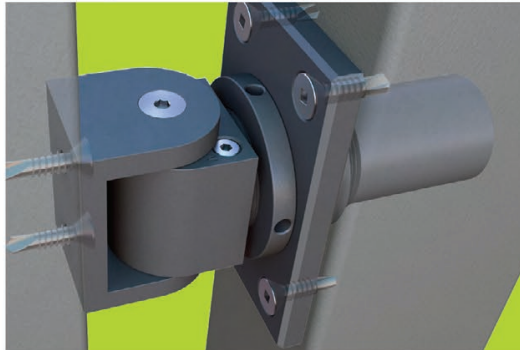
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