

Thinking Outside the Box

Advanced Metal Building Systems Can Be Flexible and Sustainable

By Charles Praeger

Since the 1950s, metal buildings have been one of the strongest players in the one- and two-story nonresidential construction market—bringing unique spaces to offices, industrial facilities, warehouses, retail centers, churches, schools, health care centers and sports venues. Yet, some members of the AEC industry still consider metal building systems to be boring boxes without any flexibility or aesthetic qualities.

Neal VanLoo, director of engineering for [Blain's Farm & Fleet](#)—a discount retailer with 35 stores in Illinois, Iowa and Wisconsin—experienced these misconceptions on a recent project. “The architect was against using a metal building system because he thought the design would be a square, fixed-dimension tin box,” he says. “We had to sit down and review the plans with him in order for him to realize the benefits of a metal building system.”

Now, Blain's Farm & Fleet exclusively uses metal buildings for new construction. For example, its 114,500-square-foot store in Verona, Wis., features a standing-seam metal roof, skylights and clerestory windows, and walls consisting of insulated precast concrete panels, split-face block and architectural metal panels.



In addition to the flexibility, quality and cost-effectiveness that attracted Blain's Farm & Fleet to metal buildings, following are some of the key reasons AEC firms should take a closer look at using these systems on future projects.

Customization

Most metal building systems are custom designed and engineered. The design team and building owner work to create a specific look, and the contractor examines possible materials to accomplish that goal—from wood, glass and brick to masonry, EIFS and factory-insulated panels. The entire building system consists of an integrated set of elements and assemblies, including structural steel frames, secondary members made with cold-formed steel and steel joists, and roof and wall

cladding elements specifically designed to support and transfer loads and provide a complete or partial building shell.

For example, the [Ace Hardware](#) in Boone, Iowa, used a combination of glass and split-face block and special insulated embossed panels to create a solid commercial building that can be adapted for a number of retail chains. The subtle colors were chosen to create a contrast with the Ace Hardware sign for aesthetic appeal, as well as long-term durability. A metal roof and wall system also were incorporated to create an energy-efficient package.

Interior spaces are designed to meet the operational needs of the building owner and can be easily expanded with a multitude of configurations. Multispans and clear spans allow for large spaces, such as atriums or stock areas, as well as the flexibility to add or reconfigure spaces. In the retail business, both of these traits help companies create and emphasize a specific brand.

Cost

What sets metal building systems apart from other steel-framed, concrete or wood buildings is their economical use of structural steel frames that are either hot-rolled shapes or three-plate built-up sections that can be tapered for strength and economy.

The entire building is purchased from a single-source supplier, which means single-source responsibility and a faster, more consistent construction process. In addition, savings arise because a metal building can be erected year-round and in one-third of the time of conventional construction due to prefabrication for a bolt-type construction onsite.

Sustainability

Metal building systems help add LEED points to a project because the steel-framed structure is a sustainable material with recycled content and recyclability at the end of its useful life. Selecting factory-insulated wall panels improves energy efficiency because of their predetermined insulation values of R-16 to R-32. Contractors can work with the design team to choose the appropriate insulation for each space.

In terms of metal roofing, paint coating advancements have improved energy efficiency, including reducing the urban heat island effect, increasing solar reflectivity and decreasing energy consumption. Some manufacturers offer Energy Star-rated roofing panels for customers interested in following the protocols of sustainable programs.

Customization again comes into play with energy efficiency because it is easy for manufacturers to incorporate skylights, clerestory windows and other daylighting solutions into metal building systems. Software and advanced technology allow building teams to see how natural daylight can flood a space and cut down on energy usage and utility bills.

In addition, metal buildings have the strength to support solar roofing panels. With a metal roof, particularly a standing-seam design, solar panels can be clipped to the seams without roofing perforations. According to a study by Ducker Worldwide, metal roofing can last 50 years or longer compared to 20 years for many other traditional roofing materials. A roof that lasts longer increases the lifespan of the solar system as well.

Performance

Metal building systems look good, are energy efficient and can save money. Plus, the strength of steel adds stability, fire resistance and a longer life cycle. Many metal roofs also are fire and hail resistant and have superior wind-uplift performance.

A series of Underwriter Laboratory-tested assemblies apply to metal building systems. In particular, the new one-hour-rated fire wall (UL Design No. W404) allows for new and retrofit metal building use and provides the required flexibility to meet future energy code requirements for higher insulation levels. The new two-hour-rated wall (UL Design No. W413) is similar in construction to W404, but includes additional materials to meet the more stringent rating.

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