Aluminum vs. Wood Window and Door Systems in Contemporary Home Design

A comprehensive look into the perspectives, perceptions and realities

Key Media & Research, commissioned by Western Window Systems

Windows and doors continue to grow as focal points in modern home design, given their contribution to a space's natural lighting, views to the outside and aesthetics.

There are a few major design trends that manufacturers in the fenestration industry have embraced. In particular, companies are marketing their new lines as "contemporary" and are making the case as to why the materials used in their products fit the bill.

However, material type plays an important role in helping architects and builders achieve their modern home design goals, and there are a variety of factors that must be taken into consideration when choosing windows with a contemporary look.

Defining Contemporary

A popular buzzword in the architecture and design space in recent years, particularly when it comes to homebuilding and residential construction, is “contemporary.” But what exactly does that mean?

Merriam-Webster defines contemporary as follows: *“marked by characteristics of the present period : MODERN, CURRENT”*

In terms of home design, this can imply a number of things.

According to the American Institute of Architects’ 2018 Home Design Trends Survey, design firms reported that open space layout has increased in popularity in recent years, as has the blending of the indoor and outdoor space. Real estate firm Crestico noted in a recent report on home building trends that one of the five trends that the real estate industry should be aware of is “more open spaces and clean lines.” In addition to the open floor designs, Crestico’s David Glenn writes that designers “have also brought the outdoors inside the home by the incorporation of more glass interior doors which are designed in such a way that they disappear after opening.”

An emphasis on clean sightlines, open spaces and blending the outdoors with the indoors has put a focus on how fenestration products such as windows and doors are implemented in home design.

Crystal Russell, CEO of Denver-based design firm TVL Creative, says two specific trends she has seen recently that define what is considered “contemporary” are “larger, open expanses of glass and dark frames.”

Russell says in two recent projects she’s worked on, “both clients opted for black coloring on the interior and exterior, and went with the largest possible sizes in each window, even if installing something like a casement.” She adds, “… clients are seeking more open view to the outdoors and fewer obstructions.”

Andy Johnson of Louisville, Colo.-based DAJ Design, says the biggest trend he sees and what his firm does in its designs is simply the use of more glass. “Specifically using large areas of windows in concentrated areas of the building instead of numerous punched openings throughout a structure or evenly dispersed openings,” he says. “Also, [the use of] large-opening doors is growing in popularity. Every client I have asks for it.”

Johnson also notes that a stronger connection to outdoor spaces is a design strategy that drives window and door selections. “We frequently use floor-to-ceiling glass applications in rooms to capture the indoor-outdoor experience and blur those boundaries,” he says.

Though different areas of the country have different obstacles due to climate and weather, these modern home design trends transcend regions in the U.S. Some climates, however, are more susceptible to others. As Hawaii-based architect Geoffrey Lewis says, the island's mild climate allows for large openings without much concern for heat gain and loss. And while solar shading can be a challenge, shading design and high-performance glazing can minimize it. "The open floor plan plays into the desire to create expansive indoor/outdoor living," he says. "Blurring that line between inside and out provides for an amazing experience."

A LOOK AT THE MATERIALS

According to the American Architectural Manufacturers Association (AAMA), vinyl makes up 70 percent of the U.S. window market, with about 15 percent of the market comprised of wood and the rest other materials such as aluminum. However, wood still holds a large share of the existing home space, as older houses often used wood framing for their original windows. Further, wood and aluminum have a larger share of the high-end contemporary residential market, which is a major focus among the luxury window and door suppliers.

In recent years, wood window and door manufactures have stressed that their products are can be an optimal solution in the demand for contemporary aspects of design. Because of this, wood windows are chosen and specified on a regular basis, particularly in regions with inclement weather, as wood is recognized as a very good insulator compared to other materials.

The use of wood does have its trade-offs, however. As the Department of Energy (DOE) notes in an online "Window Types and Technologies" resource: "Wood window frames insulate relatively well, but they require regular maintenance…" Environmental conditions such as sun, moisture and dirt can deteriorate the finish of wood, so treatment and regular cleaning of wood window frames is necessary in order to maintain their quality. The DOE points out that aluminum or vinyl cladding can reduce maintenance requirements, and that composite window frames consisting of composite wood products can improve the structural properties and moisture and decay resistance compared to standard wood windows.

Wood window and door framing poses other challenges related to design. Wood windows and doors can be limiting from a customization standpoint, as architects and builders may be restricted to more standard sizes when trying to stay within a budget. Also, specifying wood for large-size opening often includes bulky visual obstructions such as mull kits or extra structure—contrary to the desire for narrow sightlines and large, uninterrupted expanses of glass.

"We tend to use less wood for window frames mainly because the metal frames tend to express contemporary design better," says Lewis. "We do still use wood when an owner is looking for an 'Island Contemporary' look as the wood tends to give that warmer look. With regard to doors, we often use lighter wood flush doors for similar reasons. The lighter woods tend to be fresher and a bit more contemporary."

An Alternative

Despite the material's limitations, wood is still commonly used for windows and doors in the Northeast, Midwest and Southeast regions of the U.S., as well as throughout Canada. Architects and designers are less aware of alternatives such as aluminum that can help them achieve their desired outcome without sacrificing aesthetics and performance.

"Wood is frequently used in our building applications for both aesthetic and energy-efficiency reasons," says Johnson. "Metal windows and doors are tricky in [Colorado], due to our cold weather climate, even with thermally broken units."

Generally, aluminum has the reputation as a poor insulator due to the metallic properties of the material, despite its positive qualities. As the DOE notes in its "Window Types and Technologies" resource, "Although very strong, light and almost maintenance free, metal or aluminum window frames conduct heat very rapidly, which makes metal a very poor insulating material."

There also may be a perception that aluminum is not suited for residential spaces due to its appearance and assumed cost.

Russell adds that most designers and architects she knows "associate aluminum with more of a commercial use." "I don't think anyone would shy aware from it," she says, "but most folks assume it is either going to offer a more industrial look or be cost-prohibitive and so they don't explore it."

Lewis adds, “Aluminum is known in my area by contractors and architects but usually dismissed mostly for energy efficiency reasons. I personally would love the ability to use aluminum products and pass the energy requirements we set up for our projects and to, of course, pass building code.”

Of course, aluminum has traditionally been aligned more with the objectives of commercial and nonresidential architectural design, though advancements in aluminum fenestration technology and recent developments in the way the products are applied has made it ideal for residential spaces.

KEY CONSIDERATIONS FOR ALUMINUM

- Aesthetics
- Customization
- Size and strength
- Energy
- Durability/maintenance
- Cost

In order to fully understand this, the perceived challenges noted above must be addressed.

Energy Efficiency: While on its face aluminum is perceived to be a poor insulator, thermal break technology that often involves an insulating strip within the frame helps aluminum windows and doors drastically improve thermal performance. Meanwhile, the strength of aluminum allows for a lesser amount of the material used in the frame. Because glass is a good insulator—particularly in the double-glazed insulating glass form that is common in windows and doors—an aluminum-framed window system has better thermal performance than is typically assumed. They can be configured to comply with the most stringent of energy mandates, such as California’s Title 24 requirements.

“Commercial” Appearance: Aluminum is commonly used in commercial construction and applications including storefront, curtainwall and commercial windows. These applications often call for a “metallic” look, typical in a retail entrance or highrise building, and this is why most people associate aluminum with a more industrial appearance. However, aluminum window and door frames can be finished in a variety of colors and textures, including the warmer tones that are more associated with a living space.

Cost: Aluminum may be presumed to be more expensive than wood, but in fact the opposite can be true. Aluminum frames may actually be cost competitive with wood from the outset, and the material’s durability provides additional maintenance-related costs savings throughout the life of the product.

Answering the Call

Luxury fenestration product manufacturer Western Window Systems offers a product family of state-of-the-art aluminum moving glass walls, windows and doors that promote an open concept and the indoor-outdoor connection that is desired in modern home design. Because of the technology implemented in these systems and the strength of aluminum, these products are also able to meet the energy, structural and hurricane impact needs that are critical to weather-ridden areas.

Performance Comparison	Multislide Door		Bi-Folding Door		Window Wall/Fixed	
	U-Factor	CR	U-Factor	CR	U-Factor	CR
Western Window Systems	.30	57	0.30	59	.29	65
Leading Wood Systems	.27-.33	54-56	.28-0.31	52-56	.26-.27	56-59

SOURCE: Western Window Systems

CR = Condensation Resistance: How well a window resists the formation of condensation on the inside surface, expressed as a number between 1 and 100. (The higher the number, the better.)
*All products configured with Dual-Pane Cardinal 366 (surface #2) & argon.

Primary Benefits of the Performance Line

Western Window Systems' Performance line of windows and doors offers all of the key benefits aluminum provides in addition to many enhancements, due to the company's latest technological developments and designs. The Performance line includes: sliding doors, multi-slide doors, bi-fold doors, hinged doors, pivot doors, window wall, casement windows, awning windows, hopper windows, fixed windows, single-hung windows and sliding windows.

Modern Aesthetics

Aluminum is a true contemporary material and has the appearance of such. Due to its inherit strength and lack of mull kits, the Performance line requires less structure and bulk, resulting in minimal sightlines. In applications that do require additional strength, steel can be implemented as necessary.

Design Without Sacrifice

The Performance line offers complete customization, and the product is made-to-order depending on the application. Because of this, the designer and builder do not need to compromise their design with changes so that the window or door can fit a particular opening.

Bringing the Outside in

The larger-size possibilities and narrow sightlines in the Performance line can maximize views and promote the indoor-outdoor living dynamic that is essential in modern home design. The large openings also allow for increased daylight and natural ventilation throughout the home.

Performance and Durability

Thanks to the system's thermal technologies, the Performance line is on par with the energy efficiency of wood. Aluminum doesn't need to be re-stained, re-painted or refinished, and unlike wood, it isn't susceptible to warping, rotting or cracking. Depending on the stain or type of paint, wood can cost more to finish than aluminum, and interior casings can contribute to additional finished costs. Life cycle cost should also be considered, as the durability of aluminum can pay off in the long run.

Connecticut-based architect Stuart Lathers lauds Western Window Systems' products for their ability to be effectively implemented in countless designs and applications. "Western's interlocking mullion system enjoys a direct advantage over competitors' systems, allowing us an unlimited number of design possibilities for continuous and integrated compositions of fixed and operable sash windows, as well as doors," he says.

Lathers adds that the anodized finishes available for Western Window Systems' products have enabled his firm to meet clients' expectations regarding aesthetics. "Of course many of the well-known mid-century modernist designers used metal sash for window and doors," he says. "Western's thermally broken frame extrusions have allowed us to continue to work within these aesthetic parameters and meet today's strict thermal performance requirements. For certain projects, painted wood sash just won't do in terms of aesthetics."

For More Information

Key Media & Research, a third-party information and service provider, was commissioned by Western Window Systems for this report. Visit www.westernwindowsystems.com for more information on Western Window Systems, the Performance Line and the company's many other product lines.

Non-interview sources of information for this document:

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