

Paving the way

Utah 7-Eleven stores pursue energy efficiency with advanced building method By Joe Pasma

Like the Utah 7-Eleven stores, a cold-climate Starbucks Coffee shop built with SIPs preserves the chain's signature architecture.



Photograph by: Premier SIPs by Insulfoam

Energy-efficient construction is finding its way to your local convenience mart. Dozens of 7-Eleven stores in the United States have been built using an insulated panel system that's increasingly used in low-rise commercial buildings, schools, healthcare facilities, single-family homes and apartments.



Two such stores were completed this year in Ogden, and Orem, Utah. Typically, retail outlets of this nature are built using either stick framing (prevalent in the western United States) or concrete masonry units (CMUs – common in the eastern United States).

The 7-Eleven corporate office has been working with local franchisees to explore alternative construction methods to reduce energy consumption and meet other green building goals. One of the methods the company is testing is Structural Insulated Panels (SIPs).

Reducing heating and cooling use is a key step in lowering energy costs in retail settings. These two energy consumption categories account for nearly 20 percent of total energy demands in convenience and grocery stores, according to Xcel Energy, a Minnesota-based utility company. The U.S. Small Business Administration reports that discount retailers that reduce their energy costs by 10 percent can increase net profit margins up to 1.5 percent and boost sales per square foot by \$25 – so it's not just a matter of being green, but saving green for better store profitability.



Keeping the Utah cold at bay

Both Ogden, and Orem, Utah, are located in the state's Wasatch Front region, famous for its cold, snowy weather. Both cities, which are near Salt Lake City, are less than an hour's drive from world-class ski resorts like Park City and Snow Bird. Average winter low temperatures along the Wasatch Front are in the low 20s degrees, with snow sometimes falling as early as October and as late as April. By contrast, summers are hot and dry, with highs often reaching the mid 90s. It is a demanding climate in which to maintain comfortable indoor temperatures year around.

The exterior walls and the roofs of the Ogden and Orem 7-Eleven stores were built with 8-inch thick Structural Insulated Panels. SIPs are large, factory-made wall and roof components comprised of wood sheathing structurally laminated to a rigid foam insulation core. The sheathing and core work together as an engineered system capable of supporting loads commonly found in light commercial buildings.

In addition to 7-Eleven stores, SIPs have been used in other retail outlets ranging from Starbucks stores to mom-and-pop



restaurants, and in climates from Alaska to Arizona. A key reason for the growing interest in the panels is they significantly outperform traditional construction methods for energy efficiency. According to research conducted by the U.S. Dept. of Energy's Oakridge National Laboratory, SIP-built structures are 15 times more airtight than stick-framed buildings. In blower door tests, the lab found that a SIP room had an air leakage rate of 8 cubic feet per minute at 50 pascals (CFM50) versus 121 CFM50 for conventional wood framing.

Additionally, SIPs provide continuous insulation throughout a building's walls and roofs, whereas with traditional wood framing, the fiberglass insulation batts are interrupted every 16 to 24 inches by wall studs and roof joists that create thermal bridges for heat loss. The 8-inch thick panels used in the Utah 7-Eleven stores have 7.25 inch-thick foam insulation. Panels of this thickness have an overall insulation rating of R-32 (at 40 degrees F). By comparison, 2x4 wood stud framing with fiberglass batt insulation is rated approximately R-9.6.

With the large glass storefronts in the typical convenience store, one might wonder about the value of creating a tight building envelope in other areas of the structure. While some radiant heat is lost through the storefront, the bulk of energy loss in light commercial structures, such as convenience stores, is via air leaks, so sealing against those is important. Think of wearing a coat in winter: You will be much warmer with it on than not, even if the zipper is broken and it won't fully close.

Or, consider the large, glass-fronted refrigerator cases in convenience stores in which the doors are opened many times each day. Despite this, for overall energy performance the refrigerators are highly insulated on all other sides, and have tight air gaskets.

Working with SIPs in chain stores

The SIP-built 7-Eleven stores, and other retail outlets, look no different than ones built with traditional construction, thereby preserving the signature architecture important to national and regional chains.



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Designers can design a building from the start with SIPs, or can readily convert existing building plans to use the panels. Some SIP manufacturers provide design support, and will even conduct custom product and code testing, as needed to meet a client's specific design preferences.

The process for obtaining and installing SIPs is straightforward. The SIP manufacturer will review the architectural plans and produce shop drawings that specify how many panels, and of what dimensions, will be needed. The manufacturer then fabricates the panels, and labels each one according to where

it will be located in the structure. "With the pre-built panels, you just have to piece the building together like a puzzle," says Glen Kameraman, partner with Kameraman Construction, a contractor who has built many SIP buildings, including a restaurant, four-story college dormitory and single-family homes.

Contractors can use SIPs with nearly any type of building system, including poured concrete or block foundations. Manufacturers size the panels to fit with standard lumber dimensions, which enables SIPs to be easily integrated with interior walls constructed of stick framing, or with floor systems using wood I-joists.

On the job site, work crews fasten SIPs together with nails, screws or staples, using standard power tools, and mastic to help seal joints between panels and at interfaces with other parts of the structure. Because SIPs are delivered pre-sized to fit the building specifications, contractors typically do not need to cut them, although the panels can be field trimmed, if needed.

As with any building method, there is a learning curve for crews using SIPs. After completing a couple of buildings, though, construction is typically much faster than with other structural systems. Properly trained crews can reduce framing time by 55 percent compared to conventional wood framing, according to the Structural Insulated Panel Association (SIPA). SIPs help speed construction by eliminating separate work for building the structure and installing insulation. They come in large sizes, so entire walls and roofs can be completed in a matter of days for a typical convenience store, compared to a month or more with other building methods. Finishing a store faster enables the owner to begin generating revenue sooner and reduce interest on construction loans. **<CCR**