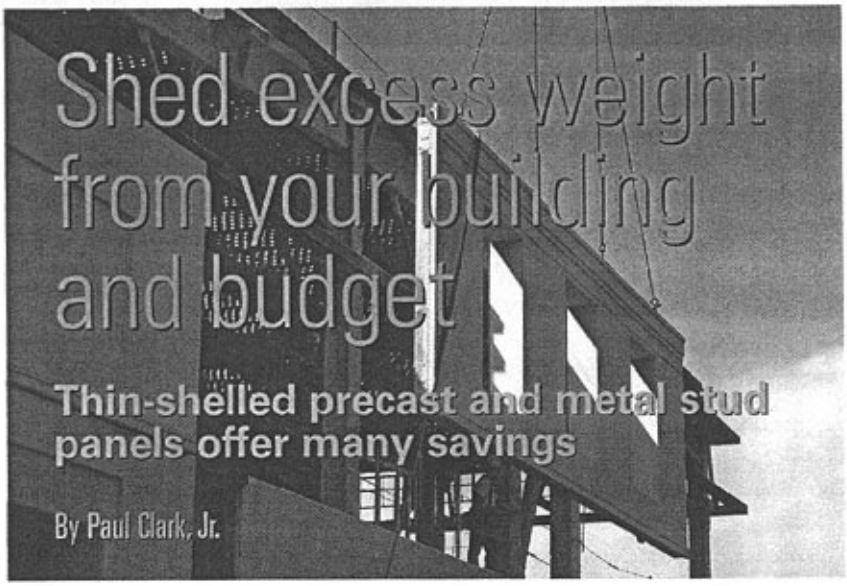


Shed excess weight from your building and budget

Thin-shelled precast and metal stud panels offer many savings

By Paul Clark, Jr.

The 146 precast panels were erected without mishap in less than two months.

Everyone in the profession knows the advantages of architectural precast concrete as a cladding material such as durability, speed of construction, design versatility, and high-quality architectural finishes. We also know its big drawback: it's heavy. Metal Stud Crete — thin-shelled precast and metal stud panels — helped cut more than 1,000 tons of dead load from the new, 30,000-square-foot Munger Research Center at the Huntington Library. And by using Metal Stud Crete, the engineers also significantly reduced the building's necessary seismic bracing — just 20 miles from the San Andreas Fault.

The Huntington Library, located in San Marino, Calif., owns one of the world's premiere collections of rare books and manuscripts, including priceless treasures like a Gutenberg Bible, Shakespeare's quartos and folios, and the papers of the Founding Fathers. The Huntington's existing facilities were taxed far beyond capacity. "We were desperate for space," explained Director of the Library David Ziedberg. "We were already storing some of the collection off the grounds."

When funding became available to expand the library's space, the Huntington staff had a wish list of uses, including laboratories for document conservation, a reading room for scholars, administrative space, and most importantly, environmentally controlled safe storage for the collection.

Together with design-build contractor Earl Corporation of Irwindale, Calif., they established the following goals:

- reinterpret the neo-classical architecture style of the Huntington's original buildings,
- complete the building within a limited budget and tight schedule, and
- create a facility that would protect its fragile treasures against the natural disasters and the ravages of time.

Early in the project, precast concrete was identified as an appropriate cladding. It could be finished to match the plaster and natural stone used on existing campus buildings. Precasting panels offsite would accelerate construction, and the durability of precast made it suitable for a projected 100-year service life. However, concerns about weight loomed even larger than usual because of two special design requirements.

Since the Huntington is located in one of the most seismically active zones of North America, the building was designed as an essential facility, exceeding code requirements by 50 percent to ensure that the collection remained protected in the event of a major earthquake. Designing for the mass of heavy concrete walls would have added to the expense of beefing-up the steel structure and bracing.

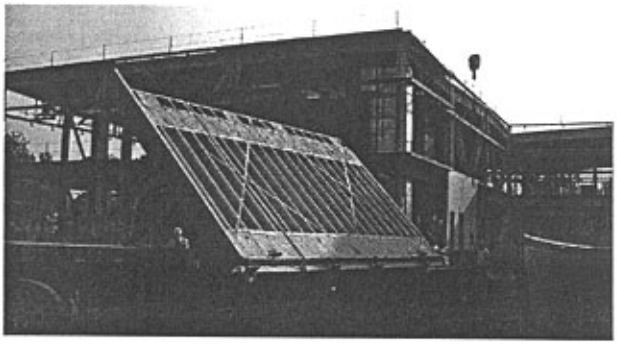
Second, the extraordinary level of climate control required for document preservation made it necessary to create a nearly airtight exterior envelope. The weight of conventional precast limits the practical size of panels to approximately 8 feet by 20 feet; this creates a large number of joints where air or moisture could infiltrate. Earl Corporation wanted to use larger panels to minimize the number of joints that had to be sealed.

Solution

With these concerns in mind, the team looked to Metal Stud Crete. The system offered all the functional and aesthetic benefits of precast, and the reduced weight helped make the project feasible. According to Structural Engineer Jackson Wu of Johnson & Nielsen Associates, "We would have needed an average thickness of 8 inches of conventional concrete. By using Metal Stud Crete precast panels, we reduced the weight of the panels by about 65 percent."

Bert England, the project designer at Earl Corporation, noted that the Metal Stud Crete system cut 6 inches from the wall thickness by eliminating the need for furring its interior surface. Multiplying this space saved by the perimeter of the building, England deduced that the panels trimmed approximately 800 square feet from the plans, further reducing project costs.

The larger panel size made possible by the panels also reduced the quantity of panel joints by approximately 40 percent and made it possible to locate joints where they could be concealed by architectural elements. With environmental control as a key design objective, the entire interior of the precast panels was sprayed with closed-cell foam to achieve a moisture barrier and thermal



The 16-foot-tall by 40-foot-long panels had to be shipped on a slanted easel at a 35-degree angle to stay under highway height and width limitations.

break and to minimize air intrusion. Temperature can be maintained in the building to within a tolerance of plus or minus 1 degree Fahrenheit.

These benefits add up. Earl Corporation estimates that using Metal Stud Crete slashed 10-15 percent off the cost of the building's structure and enclosure.

Panels were produced off-site by Coreslab Structures, Inc., of Los Angeles, simultaneously with the erection of the building's steel structure, and installation proceeded as the steel was erected. The light weight of thin-shell precast made it practical to cast, transport, and erect panels up to 16 feet tall by 40 feet long. Bob Konoske, vice president and general manager of Coreslab, commented, "It was very aggressive to make precast panels this large. Conventional precast concrete would have been much heavier. Practically, we could not have made conventional panels this big."

Challenging projects bring out the creativity of the designers and builders. For instance, Earl Corporation's designer took advantage of the large panel sizes to create a visual scale not possible with small, quarried blocks of natural stone. With almost all joints between panels concealed, the result is a virtually monolithic appearance, as if the entire building had been sculpted from a single mass of limestone.

To achieve the period look while harmonizing with the campus' original buildings, entrances and windows have 30-inch recesses that create dramatic shadows. This was the first time Metal Stud Crete had ever been used to create such deep returns. Again, challenge yielded innovation. Coreslab cast the returns in a downcast position, then the panels were rotated so the faces could also be downcast. With tight quality control, no pour lines or joints are visible at the transition between the two surfaces. Altogether, 325 precast components were cast and assembled to create a total of 146 building panels.

The huge panels had to be shipped on a slanted easel at a 35-degree angle to stay under highway height and width limitations. The panels' large size caused some concerns about fragility, but they made the 80-mile journey to the construction site without cracking, a very convincing test of durability.

The precast panels were erected without mishap in less than two months, allowing the complex HVAC systems and laboratory equipment to be installed on schedule. The Munger Research Center was completed on time and within budget, with the exterior walls accounting for just $1.5 million of the project's $20 million construction cost.

New horizons

Unusual challenges such as this highlight the possibilities of an innovative product. This doesn't mean, however, that Metal Stud Crete is only for special situations. The Metal Stud Crete system — a proprietary, thin-shell precast concrete system that marries 2-1/2-inch-thick faces of architectural precast concrete to light-gauge, steel-stud framing — is a proven, cost-effective solution that's been used on more than 1.5 million square feet of both load-bearing and curtain walls.

Structural testing has verified that the bond of the concrete to the metal framing assembly through the shear connectors achieves full composite action. Furthermore, the system is approved under International Code Council Evaluation Service Report ER-5446. ■

Paul Clark, Jr., is the vice president of Metal Stud Crete — a division of Earl Corporation, a 72-year-old general contracting firm — located in Irwindale, Calif. He can be reached at paul@metalcrete.com. For more information, visit www.metalcrete.com.