



## PROJECT SPOTLIGHT

### Aerospace building designed with top flight precast concrete panels

The new Aerospace Engineering Sciences facility at the University of Colorado in Boulder was designed in such a way as to facilitate opportunities for students, researchers, and private partners to collaborate in what is called a “center of gravity” concept.

After considering other materials, precast concrete was selected for the facility’s dynamic facade because of its flexible nature, longevity, and natural beauty. Each precast concrete plate is more than 50 ft (15 m) long and 1 ft (0.3 m) wide and comprises a series of ARCIS panels that work together to create a uniform winglike form that angles toward the front entry.

ARCIS uses stainless steel aircraft cables as prestressing strands for the precast concrete, and it has been extensively tested to ensure that it guarantees similar capabilities to traditional precast concrete.

“Innovation and research are key elements of the aerospace industry, and ARCIS embodies these principles,” says Daniel Butler, preconstruction manager with Gage Brothers in Sioux Falls, S.Dak., which was selected as the precaster.

Other precast concrete materials in the facility include window sills and parapet copings.

One aspect was particularly challenging during the design phase of the project. “A late design change from mineral wool insulation to a closed-cell spray foam was a difficult hurdle to overcome,” Butler says. However, working in collaboration,

the contractor, design team, and owner redesigned the track system to allow the closed-cell spray foam to be virtually unpenetrated. Connections to the structure were specifically engineered to allow for field tolerance within the system, thus maintaining a thermal break between the precast concrete cladding and supporting structure, while providing the desired final look.

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—Daniel Butler

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In terms of fabrication, this was the first large-scale project for Gage Brothers using its new ARCIS product. “Coordinating the sorting and storage of over 1000 pieces was a challenge,” Butler says. To address the problem, the company made custom racking for pieces to stand vertically like traditional panels. “This not only saved us room in our yard but also eliminated the chances of bowing in our panels,” he says.

Logistics and shipment presented virtually no challenges. “We were able to ship 15,000 ft<sup>2</sup> of precast on four to five truckloads from Sioux Falls,” he says. The only challenge related to sorting once the pieces were delivered. Gage joined the erector on the project site to aid in inventory and sorting.

Installation involved a lot of teamwork. “ARCIS is a newer product to the Midwest,” Butler says. “It is not in the wheelhouse of what a traditional precast installer is used to or is something a mason is well-versed in,” but the team got the job done. “The best experiences come from our joint project teams working together to meet these challenges,” he says.

—William Atkinson

**The Aerospace Engineering Sciences facility at the University of Colorado in Boulder used precast concrete ARCIS panels from Gage Brothers to create the winglike facade.** © David Lauer Photography, 2019, [www.davidlauerphotography.com](http://www.davidlauerphotography.com).





The New Bed Tower at Texas Health Frisco in Frisco, Tex., used precast concrete from Gate Precast Co. to accomplish a holistic healing environment that met local exterior requirements. Courtesy of Daryl Shields, HKS Inc. Compiled by K. Michelle Burgess ([mburgess@pci.org](mailto:mburgess@pci.org))

## Precast concrete aids holistic design in Texas

These days, hospitals need to be more than brick and mortar. The facilities themselves are expected to be part of the healing process for patients.

One way to accomplish a holistic healing environment is to integrate natural patterns within the design, which can contribute to stress reduction, improvement in overall patient health, expedited healing, and even enhanced performance by the staff. These patterns can involve a hierarchy of tactile, visual, and abstract natural cues in the building, which help to connect people with the natural environment.

One such project achieving these goals is the New Bed Tower at Texas Health Frisco in Frisco, Tex. For this project, the designers opted for an insulated precast concrete facade because it could provide the best material to represent the holistic healing environment and design narrative.

Due to city requirements, a natural masonry exterior was required, and several such systems were considered, including brick, natural cut stone, ceramic panels, and precast concrete. Based on a combination of cost savings, ease of installation, and the best ability to express the desired design concept and narrative, the obvious choice was precast concrete, and Gate Precast in Hillsboro, Tex., was selected as the precaster.

Initially the city was hesitant to consider precast concrete, based on its lack of familiarity with the features and benefits of this type of structure. However, after the design team provided additional information, including detailed mock-up samples and how the natural concept was manifest in surface treatments, aggregates, mix coloring, and patterns of the precast concrete, the city understood its role and value and approved its use.

“Once the teams began working, we began a series of sample selections for color and textures, as well as mock-ups to dial in the line work and jointing of the precast panels,” says Mo Wright, marketing director for Gate Precast. “The goal was to have as random a look as possible and make it difficult to read panel jointing and repetition throughout the building facades,

but at the same time providing an economical product solution for the owner.”

One key to success here involved the use of generative design tools, which were able to take design discussions in real time and input these ideas into the modeling workflow. “Not only did this help from an aesthetic standpoint, but it also guaranteed the maximum use of mold work before a mold rebuild would occur,” Wright says. “This was huge in keeping the look that the team wanted while at the same time being cautious of the project’s budget.” Not only did the generative design tools calculate the mold work itself, but they were able to input the panel finishes (polished, acid etch, sandblast, and exposed aggregate) into the software and automate the areas selected for finishes at random.

Overall, according to Wright, the use of architectural precast concrete provides a more resilient facade for the owner and operator of the hospital facilities and its total-precast concrete parking structure, reducing annual maintenance costs.

—William Atkinson

**The New Bed Tower at Texas Health Frisco has a random look to make it difficult to read panel jointing and repetition throughout the building facades. The project used generative design tools to calculate the mold work and input the panel finishes into the software. Courtesy of Daryl Shields, HKS Inc.**

