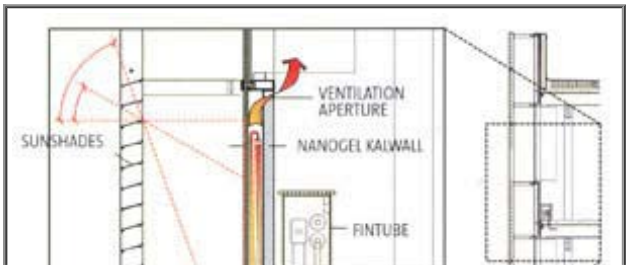
Kalwall+ Nanogel® Shapes Art and Efficiency at Yale Sculpture Building and Gallery with One-Of-A-Kind Active Façade

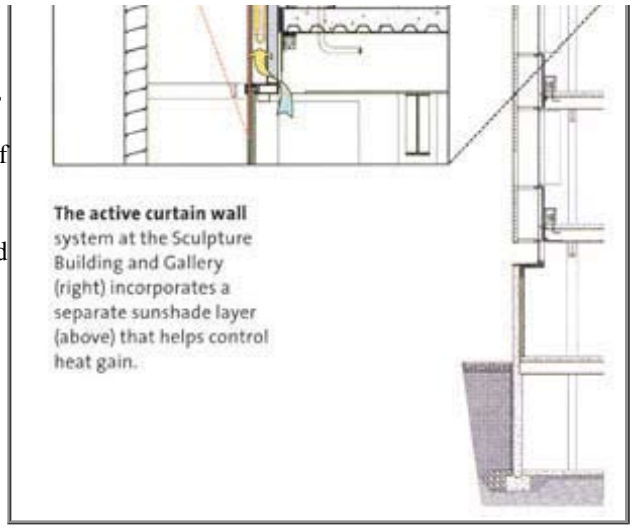
Traditionally, a solid wall is thought to be the best way to minimize heat loss or gain. But eliminating natural light is of little inspiration to students studying and creating works of art, and even the most efficient windows wouldn't allow Yale University, in New Haven, Connecticut, to reach its energy conservation and greenhouse gas reduction goals. While the various iterations of Kalwall translucent panel systems achieve thermal performance that rivals a solid wall and still transmit daylight, design firm KieranTimberlake Associates envisioned using the building's structure and systems to create a unique active façade of a controlled airspace around the building's surface. The solution for Yale's Sculpture Building and Gallery was a unique curtainwall of Kalwall+ Nanogel translucent panels, blended with windows and sunshades to create a truly unique, active curtainwall system. The design is more than the utilization of the leading edge in daylighting building systems. As an innovative application of materials and an exercise in seeking solutions beyond the intended attributes of the systems, the whole is greater than the sum of its parts.

"The greatest challenge was balancing energy performance with the transparency of the building," says project architect Johann Mordhorst. At 60,000 square feet and four nearly transparent stories, sited in a New England city prone to extremes in temperature, the building and its 14-foot-high studios could have been an HVAC nightmare. The building employs a unique displacement ventilation system in which air is introduced at low velocities and at higher than usual supply temperatures for increased energy efficiency and improved thermal comfort. To maintain a predominantly transparent envelope, without compromising the building's high level of energy performance, a curtainwall of triple glazing and insulating translucent Kalwall+ Nanogel has been combined with an exterior sunshading system to reduce solar heat gain in the interior. The translucent panels, infilled with this super-insulating aerogel, significantly reduces solar heat gain as well as cold-weather heat loss. The system is so efficient, it balances the overall performance losses of the glass areas. The design called for eight-foot operable windows, triple-glazed low-E vision panels, and double-cavity spandrel panels of Kalwall+ Nanogel. Warm air is trapped in the cavities, creating a thermal layer to increase energy performance while the entire façade admits natural light into the space.



High-performance Kalwall+ Nanogel curtainwall surrounds the tall individual and group studios on the upper levels, a large gallery, and a conference room ideal for lectures and smaller exhibitions, as well as shops and teaching space on the first floor. Workshops allow graduate-level sculpture students to do metal- and woodwork, and cast and finish plastics. The building is a landmark in Yale's green agenda. Designed, says Mordhorst, with an eye toward sustainability, the Yale Sculpture Building and Gallery is seeking LEED® certification. "The new building will also help to solidify the cohesiveness of the School of Art," says assistant

professor of sculpture Joseph Scanlan.



The active curtain wall system at the Sculpture Building and Gallery (right) incorporates a separate sunshade layer (above) that helps control heat gain.

Natural daylighting is increasingly being used in educational buildings of all kinds, from daycare through the university level. Benefits, both measurable and anecdotal, include a healthier environment, improved attendance, better attitudes of the students and their teachers, higher test scores, even a higher regard for the facility itself by those inside the school and as well as within the surrounding community. And with natural light so important to the understanding, creation, and display of art, it's easy to see how critical it is for the Yale facility.

In addition, the Yale Sculpture Building and Gallery is one of three projects recognized by *Architect* magazine's First Annual R+D Awards, in the area of lightweight façade systems. The building also picked up a Silver Medal from the American Institute of Architects' Pennsylvania chapter, and the AIA's Board of Directors honored KieranTimberlake Associates with the 2008 AIA Architecture Firm Award, based on their sustainable designs and research. And the AIA Committee on the Environment named the Yale facility a Top Ten Green Project for 2008. Through this transparent building, it's clear to see how projects with Kalwall+ Nanogel are becoming more innovative at daylighting and, at the same time, allowing ever-greater energy efficiency.

Yale Sculpture Building and Gallery
Architect: KieranTimberlake Associates LLP

Learn more about KieranTimberlake's unique design approach and research into active façades.

Kalwall Specifications
U-Factor: 0.05 Btu/hr/ft²/°F = 0.3 W/m²K
Light Transmission: 20%
Solar Heat Gain Coefficient: 0.20

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