

Case Study



California State University

SAN MARCOS, CA

Owner

California State University

Architect/Designers

AC Martin Partners

Vitro Products

Solarban® 70 glass

Glazing Fabricators

Oldcastle BuildingEnvelope®
Los Angeles, CA

Glazing Contractor

Division 8, Inc.

PROJECT BACKGROUND

Studies show that bright buildings can produce bright students. At the new College of Business Administration at California State University – San Marcos (CSUSM), they produce significant energy savings, too.

That's because the building, designed by Gail Bouvrie, AIA, of AC Martin Partners in Los Angeles, is one of the first buildings in the country to feature Solarban® 70 (formerly Solarban® 70XL) glass, a revolutionary solar control low-e glass from Vitro Architectural Glass (formerly PPG Glass). In addition, DURANAR® SUNSTORM® coatings from Vitro Alliance Partner, PPG Industrial Coatings, were used to protect and beautify the aluminum extrusions used in the window and door frames and other metal architectural components.

A light-filled, 72,500-square-foot complex, the new building, also known as Markstein Hall, incorporates 27 classrooms in one three-story wing and 88 faculty offices in a separate four-story wing. High-tech accoutrements include teleconferencing equipment in each classroom, high-speed internet access wired into every desk, and state-of-the-art video and acoustical components to facilitate both on-site and distance learning.

Despite all these technological embellishments, perhaps the building's most significant yet understated advance is the glass that envelopes it. AC Martin Partners was the architectural firm that designed the Joe Serna Jr. California



California State University's College of Business Administration Building was one of the first buildings in the U.S. to capitalize on the performance and aesthetic benefits of Solarban® 70 glass by Vitro Architectural Glass (formerly PPG Glass).

Environmental Protection Agency Headquarters Building in Sacramento, a LEED® Platinum-Certified structure that is widely regarded as the “greenest” high-rise building in the country. Ken Lewis, AIA, a principal with the firm, was in charge of Markstein Hall.

As a leader of such an environmentally progressive firm, it's no coincidence that one of Lewis' goals was to make Markstein Hall as sustainable as possible. It is also the reason he chose to make the new building one of the first in the country to capitalize on the performance and aesthetic benefits of Solarban® 70 glass.

More Light, Less Heat

Introduced at the GreenBuild 2005 International Conference and Expo, Solarban® 70 glass constitutes a major advance in the architectural glass industry for two reasons. First is the glass' remarkable solar control performance. Combined with traditional clear glass in a conventional one-inch insulating glass unit, Solarban® 70 glass blocks up to 73 percent of the sun's solar energy, while transmitting more than 63 percent of its visible light. The result is an unprecedented Light to Solar Gain (LSG) ratio of 2.33.

Second is the glass' transparency. Solarban® 70 glass is the only architectural glass in the industry to combine such an exceptional level of solar control with a clear glass aesthetic. In fact, before the introduction of Solarban® 70 glass, the highest-performing non-tinted solar control, low-e glass transmitted 70 percent of the sun's visible light in a one-inch insulating glass unit, while blocking only 56 percent of its solar energy. The resulting LSG of 1.84 was 21 percent less than that of Solarban® 70 glass.

The potential energy savings associated with Solarban® 70 glass was highlighted in a recent study conducted by an independent energy and environmental research firm. The study compared the energy performance of six glazing configurations, including several competing solar control low-e glasses, on three common building types in 12 North American climates. It showed that architects and building owners could cut capital investment in a building's cooling plant by up to 26 percent when substituting Solarban® 70 glass for other leading solar control low-e glasses. The study also showed that building owners could

Example 1 Building Type: Eight-story office building, window wall
Total Glass Area: 56,640 ft²

City	Annual Operating Expenses		Annual Savings	Total HVAC Equipment Cost		Immediate Equipment Savings	1st Year Savings
	SB60	SB70		SB60	SB70		
Atlanta	\$622,492	\$586,400	\$36,092	\$1,267,770	\$1,146,495	\$121,275	\$157,367
Boston	\$764,793	\$729,696	\$35,097	\$1,251,705	\$1,136,450	\$115,255	\$150,352
Chicago	\$370,681	\$352,779	\$17,902	\$1,252,297	\$1,137,731	\$114,566	\$132,468
Denver	\$397,799	\$375,521	\$22,278	\$1,292,788	\$1,168,451	\$124,337	\$146,615
Houston	\$761,534	\$718,618	\$42,916	\$1,253,879	\$1,140,825	\$113,054	\$155,970
Los Angeles	\$623,649	\$582,454	\$41,195	\$1,263,556	\$1,144,014	\$119,542	\$160,737
Mexico City	\$707,060	\$668,434	\$38,626	\$1,278,536	\$1,154,115	\$124,421	\$163,047
Ottawa	\$431,308	\$412,595	\$18,713	\$1,247,862	\$1,133,965	\$113,897	\$132,610
Philadelphia	\$378,447	\$365,425	\$13,022	\$1,249,329	\$1,132,635	\$116,694	\$129,716
Phoenix	\$394,492	\$374,898	\$19,594	\$1,256,077	\$1,140,972	\$115,105	\$134,699
St. Louis	\$310,660	\$294,417	\$16,243	\$1,274,889	\$1,156,292	\$118,597	\$134,840
Seattle	\$299,472	\$284,629	\$14,843	\$1,237,408	\$1,125,334	\$112,074	\$126,917

anticipate on-going energy savings of 3 to 5 percent annually for buildings constructed with Solarban® 70 glass (see chart above).

Real World Performance at San Marcos

Thanks in part to Solarban® 70 glass, building owners have realized a significant and immediate payback on their initial building investment.

For instance, Lewis estimates that by specifying Solarban® 70 glass for Markstein Hall, he was able to lower mechanical costs for the building by \$2.00 to \$3.00 per square-foot. These savings were related primarily to a lower chilling capacity requirement, as well as smaller fan sizes and ducts.

Yet, these initial cost reductions were just the beginning. Working closely with San Diego Gas & Electric (SDG&E), Lewis and his building team were able to earn more than \$100,000 in incentives through the utility's Savings By Design program. According to program administrators, Markstein Hall is expected to generate annual energy savings of almost 500,000 kilowatt-hours, or approximately \$75,000 per year at current energy prices.

While Solarban® 70 glass does dramatically reduce solar heat gain, it is not the sole reason for DURANAR® coatings from Vitro Alliance Partner, PPG Industrial Coatings, Markstein

Hall's energy efficiency. Instead, the glass functions as part of a comprehensive energy management system featuring a demand-control ventilation system and carbon dioxide sensors that can trigger fresh air intake, helping students to stay alert during their studies.



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Another highlight is multi-switched, multi-level lighting fixtures that combine compact fluorescent, linear fluorescent, metal halide and other fixtures with abundant natural light to provide direct and indirect light. Not only does the natural light and fresh air contribute to energy savings; the combination is expected to enhance student performance as well.

For more information about Vitro Alliance Partners, Solarban® 70 glass and other Cradle to Cradle Certified™ architectural glasses by Vitro Glass, visit vitroglazings.com, or call 1-855-VTRO-GLS (887-6457).

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