

Building Envelope News

Summer 2007

ZERODRAFT® Plays Key Role in LEED® Platinum Home

The Near-Zero Energy Home, in Paterson, N.J. is an example of residential energy-efficiency at its best – and ZERODRAFT® single- and plural-component insulating air sealants were front and centre in its construction.

Completed in 2006, the Near-Zero Energy Home in Paterson, N.J. is the cornerstone of the BASF Better Home, Better Planet initiative and only the second home to achieve a Platinum rating under the United States Green Building Council's Leadership in Energy and Environmental Design for Homes (LEED®-H) program. The project is an effort by BASF to promote the adoption of more sustainable practises in the residential construction industry. The new home in Paterson is the first phase of the project and is designed to be a model of high-performance, energy efficiency and ecological benefits in new housing. It will also serve as a functioning residence for a New Jersey family with a special needs child.

The home's near-zero energy performance is based on three major systems: the building envelope, solar power and mechanical HVAC. The three systems work together to create a home that uses 80 per cent less energy than an average home. Added benefits of the BASF Near-Zero Energy Home include increased severe weather resistance and reduced operating costs for the homeowner.

ZERODRAFT insulating foam sealants play a key role in the Paterson home by joining the sum of the building envelope's parts together into a seamless system. This helps the home's high-efficiency HVAC system to function properly by controlling air flow and reduces the chances that pollution, allergens and mould will infiltrate the home.



The building envelope materials used in the Near-Zero Energy Home-Paterson, N.J. include Insulated Concrete Forms (ICFs) for the basement and first floor, which were chosen for their superior insulation values of R-24 to over R-50.

The second floor and roof were constructed using Structural Insulated Panels (SIPs) to form a solid, continuous thermal envelope around the structure to substantially reduce air infiltration and eliminate convection looping.

ZERODRAFT sealant joins the panels together and was also installed in hard-to-build areas such as around windows and doors and at transition joints to create complete air barrier continuity between all the components of the building envelope. The project incorporates Zero-Energy Housing (ZEH) concepts from Oak Ridge National Laboratory and the building science principles of PATH/Build America expert, Steve Winter, AIA. It has also achieved a HERS rating of 95.5 – performing more than 78 per cent better than the Model Energy Code.

In recognition of the home's contribution to creating a new, sustainable standard in residential construction, BASF has also been awarded the New Jersey 2006 Governor's Environmental Excellence Award in recognition of the Paterson home and a 2006 Leadership in Responsible Land Use Award from the Northern New Jersey District Council of the Urban Land Institute (ULI-NNJ), a non-profit organization that promotes sustainable design. The award is given to leaders in both the public and private sectors who demonstrate excellence in real estate planning and development.

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The connection between smoke, energy and comfort

Too often, building management issues are discussed in isolation to one another. Smoke safety, energy efficiency and occupant comfort appear to be unrelated and are treated individually. But these three critical issues are very much connected and should be examined in relation to one another.

The connection between these issues is air movement. Uncontrolled air movement carries smoke, pollution, allergens, dust and odours from unit to unit. As the air travels and escapes out of the building, it forces the HVAC system to work harder and saps energy dollars from a building's budget. Occupant comfort is disturbed as they experience drafts, unpleasant smells, the harmful effects of tobacco or fire smoke, and the displeasure of higher energy bills or condo fees.

The most severe consequence of unchecked air movement is the spread

of smoke during a fire. Smoke travel to the upper floors of a building is nearly always the cause of fire-related deaths, writes Ken Richardson of Ken Richardson Fire Technologies, Inc. in *Fire Safety in High Rise Apartment Buildings*, a joint publication of the Ontario Association of Architects and the Canadian Mortgage and Housing Corporation (CMHC). Why? Because once a fire starts, smoke travels quickly upwards through a high-rise building.

Fire Code requires that penetrations that run through the building – including those for pipes, ducts, and electrical cables – must be sealed with fire-rated sealants. These are designed to create a compartmentalized building which helps to control fires. But even when the building is built entirely to Code, gaps under doors, open vents in a unit and failures in the fire-rated assemblies due to repairs or renovations can compromise compartmentalization. Sealing these



areas properly can reduce the dangers of smoke spread.

Controlling air leakage has also been proven to improve energy efficiency. "Payment by results" energy efficiency projects performed by energy service companies (ESCOs) have regularly included air-sealing upgrades to allow them to better control HVAC systems. The results included downsized mechanical equipment and lower operating costs.

A side benefit to a smoke safety and energy efficiency retrofit is improved occupant comfort. This makes tenants, owners and residents happier, while reducing stress and complaints for property managers. A good leakage control strategy will solve drafts and cold spots and reduce irritants such as noise, cigarette smoke, pests, flies, dust and allergens.

Making the connection between smoke safety, energy efficiency and occupant comfort can lead to safer, happier residents and lower energy bills. Promoting awareness of the connection to property managers, condominium boards and owners can help create a culture of healthier, safer and more energy efficient buildings that will benefit all.

IN THE MEDIA

Canam Building Envelope Specialists' president Tony Woods and national sales manager Steve Tratt have made several appearances in industry magazines this year. Their story, "Tightening the building envelope: Bringing HVAC into the fold", was published in the February issue of *The Construction Specifier* magazine for the American market and a new article on the relationship between insulation and the building envelope appeared in the March issue of *Construction Canada* magazine.

The impetus for the article was the publication of the 2005 National Institute of Science and Technology report "Investigation of the Impact of Commercial Building Envelope Airtightness on HVAC Energy Use". The NIST report formed the basis for the impending changes to the American Society of Heating, Refrigerating and Air Conditioning Engineers' (ASHRAE) Standard 90.1-2004 Energy Standard for Buildings Except Low-Rise Residential Buildings requiring all buildings to include a continuous air barrier. (See article ASHRAE Updates on page 3 of this issue).

Tony Woods was also pleased to be asked to be a part of the Winter 2007 issue of the *Journal of Building Enclosure Design*. The article, "Calculate the costs, prove the performance" explained the value of using energy-calculation software to determine the energy savings that can be generated when a high-quality building envelope is specified. The article can be found online at http://www.nibs.org/JBED/JBED_Winter07.pdf

Please keep an eye out for more articles by Canam personalities in the future. And send us your ideas! We are always looking for inspiration in your stories.



Back from the brink

Once considered too damaged to save, a Louisiana hospital is re-sealed and revitalized

After almost 60 years of service to the community of Homer, Louisiana, Homer Memorial Hospital was in desperate need of a renovation. Operating round-the-clock in Louisiana's southern heat, the structure had begun to deteriorate from constant wear and tear and small, but numerous, alterations to the building envelope.

When Doug Efferson became Homer Memorial's administrator in 2005, one of his primary mandates was to fix the building up. Staff members in the 50-bed, 39-room facility were complaining of poor interior temperature control, dust was a persistent problem and air circulation was completely uncontrolled – a situation made worse by temporary solutions like ceiling fans.

Mike White, owner and operator of Clean Air Systems of Louisiana, had been working with the hospital for almost a decade on remediation projects related to the poor condition of the structure. Several renovations over the course of the years had made a patchwork of the building envelope and, as a result, holes of all shapes and sizes littered the building's exterior and interior. In addition, nine ventilation

units had been placed on the roof of the building in an attempt to stabilize the building's interior air pressure.

The result of these "improvements"? The ventilation units sucked air out of the building while the holes in the envelope allowed rampant infiltration. The building was, essentially, a wind tunnel. At times, White says, the suction was so strong it would hold doors ajar long after they had been passed through. This, and persistent problems with mould and dust, had left some at the hospital wondering if the building was worth keeping at all.

So when the decision was made to resolve the building envelope's problems, it was the opportunity White had been waiting for. Just prior to the project, White had become a ZERODRAFT® Authorized Applicator and he knew it was the perfect product for the job. Clean Air Systems won the bid and, since it was his first ZERODRAFT project, White called up Steve Tratt, National Sales Manager for ZERODRAFT, to come down and assist in the project.

He was more than pleased to fly in from Canada, says Tratt, because the project was an interesting one and

ZERODRAFT's mandate is to give their Applicators all the support they need to get the job done right.

Together, Tratt and White set out to bring Homer Hospital back to optimum functionality.

Tratt helped White build a comprehensive air-flow assessment in real time, with a real structure, a great benefit for a first-time project of this size. Using standard tools of the trade, including smoke pencils to pinpoint infiltrating and exfiltrating air, a physical inspection of the structure, and the EC 128 energy-use assessment software, the team built a report that quantified the project's goals.

The assessment revealed a building envelope that was in a state of fairly advanced decline, says White. He was astounded at some of the failures that they found.

"There were some holes in there that were so bad that we had to go in and build walls to fix them. One of the holes was eight feet tall and 16 feet wide," he reports. "The original hospital was probably built well, but when they started updating, problems were created. For example, they had a



From L to R: overhang surrounding exterior of hospital; site testing; sealing ductwork with ZERODRAFT; pipe penetration leakage site.

lot of air infiltration from this furdown in the structure...we actually went in and cut access holes into the overhang and we got up in there and you could crawl around. The furdown went around the whole building and it had holes that were anywhere from a two-inch gap to an eight-foot gap."

Over the course of almost three weeks, Clean Air Systems filled intersections in the building envelopes – between floors and walls, for example – with ZERODRAFT polyurethane insulating air sealants, built walls, and re-sealed the building's windows and doors with ZERODRAFT high-performance weatherstripping.

With the airflow controlled, holes and penetrations sealed, and ventilation units working properly, both Clean Air Systems and the hospital's staff deemed the project a success.

"Feedback was instantaneous," says Efferson of the work done by Clean Air Systems. "Housekeeping noticed a significant reduction in dust in patient rooms. Maintenance noticed a significant reduction in calls regarding temperature issues. Hospital board members noted the reduced humidity and temperature variations during their monthly meetings. Nursing took down oscillating fans in the nurses' station. The examples are numerous, but the point is clear. There was a

hospital-wide improvement in indoor environment and HVAC performance once Clean Air Systems completed their job."

White is just as effusive in his enthusiasm for the project: "Within a week they were like 'wow, this is a different building,'" he says happily. "And now, they're just tickled to death with the building, they love it. They're actually getting ready to put an addition on the building."

While the hospital has not yet conducted an energy-use audit since the renovation took place, Efferson says the difference in the building is still palatable and they remain pleased with the work.

"The job done by Clean Air Systems resulted in two major accomplishments," he says. "First was the creation of positive pressure in the hospital. While updating air handlers and fresh air supplies might have helped, Clean Air Systems effectively sealed the hospital so that there is a measurable positive pressure generated by existing HVAC systems. This reduced the influx of dust, fumes, and humidity."

"The second is HVAC efficiency," he continues. "The ability to maintain control of air temperature and humidity has greatly improved. For example, last summer we were able

to keep temperatures comfortable for the first time in years. While I am sure we have had some energy cost savings, the ability to control the hospital environment is much more important than any cost savings that occurred."

Apparently, the state Department of Health and Hospitals seconded the renovation's success. In an article in the *Guardian-Journal*, Homer's local newspaper, dated August 1, 2005, the administration celebrated the cleanest bill of health it had received in over 25 years. In an interview with the newspaper, Efferson said:

"For the first time in memory, the hospital was given a deficiency-free survey, meaning the surveyors could not find a single area in which the hospital required improvement or follow-up actions. This is almost unheard of in the state inspection process and is a high honour for Homer Memorial Hospital."

From the brink of despair to the start of a new, almost \$2 million renovation started May 2007 – the transformation of Homer's hospital has been a great success story and ZERODRAFT is pleased to have played a key role.



New England Campus Gets Upgrade

The New England climate requires special attention to the building envelope – steamy summers and freezing winters can wreak havoc on building materials. That’s why Amherst College in Amherst, Maine and Boston architectural firm Shepley Bulfinch Richardson and Abbott chose ZERODRAFT® foam sealant and BASF Polyurethane Foam Enterprises LLC WALLTITE® insulating air barrier system when they recently rebuilt the College’s James and Stearns Residence Halls.

“Dramatic temperature changes in the Northeast climate mean we have to be especially concerned about building envelope failures,” says Shaun Landon, project manager at Shepley, Bulfinch, Richardson and Abbott. “Whenever you have warm air coming out of the joints in the winter, for example, the performance of your building envelope is at risk. It’s difficult to make sure that every joint in a building is impermeable. With spray polyurethane foam, you remove that problem.”

The James and Stearns Residence Halls compose the east side of Amherst’s historic quadrangle, each measuring approximately 36,000 square-feet. The buildings feature steel-frame construction with concrete block backup and a brick veneer. The design includes wood windows and copper roofs.

The architectural firm took special care to use building-envelope materials that would help to preserve

the classic look of Amherst’s existing campus while providing high performance in the local climate. In choosing modern materials such as ZERODRAFT, they were able to construct a weather-tight building envelope underneath a classic red brick façade. Landon said the firm chose the products because they “provided a tight, efficient, high-performance building envelope.”

“We recommend foam on many projects,” he says, emphasizing the

firm’s satisfaction with their previous experiences with spray foam and foam sealants. “We brought in the construction manager early in the process to view a foam application on another building. He accepted it with open arms. We then recommended foam to Amherst College, whose facilities team had not seen the concept before. They quickly realized that this was not only a quality air barrier and insulation product, but that the schedule would benefit as well.”

ASHRAE Updates

The American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) has several items currently on its agenda of relevance to the building envelope industry.

The first item is the proposed update to ASHRAE’s Standard 90.1-2004 Energy Standard for Buildings Except Low-Rise Residential Buildings. The proposed amendment, under Addendum z to Standard 90.1-2004, requires all buildings (except low-rise residential) to include a continuous air barrier system. The proposed change is the first time that air barrier language has been included in the universally accepted energy efficiency standard. Public review of the amendment is complete and publication of the standard is expected this year.

In other ASHRAE news, the organization has formed a new technical research group focusing on sustainable building guidance and metrics. The group will develop design guidance, performance metrics and rating systems to integrate environmental quality, energy efficiency and other aspects of sustainable building performance. The group will work with other organizations to integrate HVAC & R systems with other building systems, including the building envelope and air barrier systems, to enhance the effectiveness of total building design and integrated practice.

For more details, visit www.ashrae.org



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your way to increased profits

ZERODRAFT Authorized Applicators (ZAA) include many different kinds of small and medium-sized companies in both the residential and the industrial, commercial and institutional/public sector (ICI) markets. Many have a background in insulation, renovation, heating and air conditioning, energy conservation or even roofing, siding or windows.

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