Energy Wall™:
A Passive Heat And Moisture Transfer Membrane For Ventilation Air Recovery

Impact: Commercial and residential buildings consume over 39% of the energy used in the U.S. For large building airflow applications, energy wheels are the current method of achieving total energy ventilation recovery. However, energy wheels result in poor indoor air quality, consume excess energy with their high rotation speeds, and have unacceptable rates of exhaust air cross-contamination from leaky seals. There have been numerous cases where energy wheels have been turned off or even removed from a system due to poor indoor air quality.

Energy Wall products will save the average commercial building over 15% of annual energy costs, with a return on the initial equipment investment within three years. Energy Wall's main advantage is a membrane that allows heat and water vapor to pass through while blocking exhaust air. Energy Wall is low maintenance, has no moving parts, and actively cleans the air of bacteria and mold growth, resulting in superior indoor air quality for healthy buildings.

Project Overview: For this project, the team will install, test, and demonstrate a ventilation total energy recovery unit in an elementary school. The team will monitor the effectiveness of both the energy recovery of the system and the building air quality, as well as the system's ability to eliminate contaminants that might be harmful to building occupants. Pennsylvania State University's Indoor Environment Center will provide assistance in researching and monitoring building energy use and indoor air quality. The project has the potential to save a public school 15% in yearly energy costs, contribute to it achieving up to three additional LEED® (Leadership in Energy and Environmental Design) credits, lower maintenance costs, reduce air conditioning equipment size by up to 40%, and provide better indoor air quality for students. If accepted nationwide, Energy Wall could positively impact all residential, commercial, industrial, and transportation end-use sectors.

GBA Product Innovation Grant Amount: $100,000

Leadership Team: Energy Wall's team is lead by Dustin Eplee, Energy Wall President and Burt Hill employee. The University partner is Dr. William Bahnfleth, Professor of Architectural Engineering and Director of the Indoor Environment Center at Pennsylvania State University. Energy Wall is the manufacturer of an innovative patent-pending membrane technology for high efficiency ventilation air recovery equipment.

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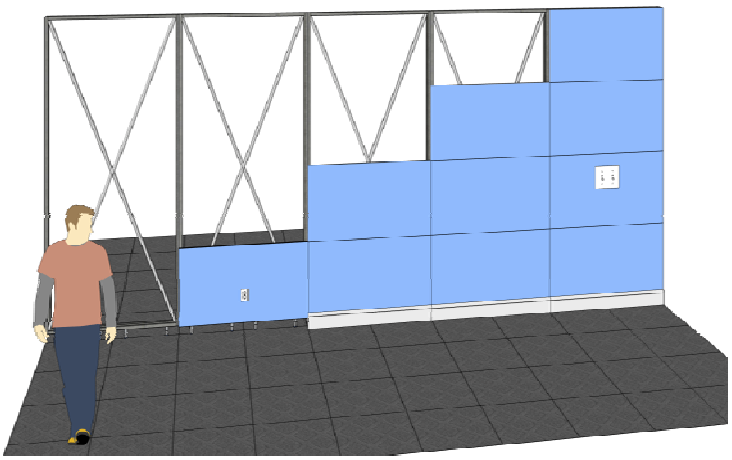
Flexible Floor Plans: A Modular, Reconfigurable, and Sustainable Floor and Wall System



Impact: As buildings become more sustainable, there remains an inevitable need to renovate for more space or reconfigure floor plans. For a variety of reasons, homeowners often have to renovate or move to new homes, which can result in large quantities of material and energy wasted. For green buildings, material reuse is encouraged, but old wall and floor materials are often difficult to reuse. One possible solution is a modular wall and floor system that can provide an abundance of floor plan flexibility, better indoor air quality, and improved energy efficiency.

The proposed flexible floor plan system encourages smaller and smarter building design, allowing for waste-free renovations. Additionally, construction times for new homes could be significantly reduced if interior walls did not need to be placed until the house was ready to move into.

Project Overview: The project team will design and test a modular floor and wall system prototype that is sustainable and appropriate for residential applications. The model will be lightweight to allow for reconfiguration by ordinary residents, allow for customized finishing materials, be soundproof, and maximize the usage of local materials. For the modular floor prototype, Drexel will be adapting a Haworth raised floor. The finished product will allow for future homes that have the potential for inexpensive future renovations that are easy to do and significantly less wasteful. Additionally, the project will develop a guideline for integrating underfloor ventilation and electronics such as light switches and thermostats into the modular floor plan. This underfloor system will reduce residential operational costs by reducing energy usage and minimizing the need for renovations. In turn, residents will feel more encouraged to stay in their homes or apartments longer.

GBA Product Innovation Grant Amount: $20,000

Leadership Team: This project is led by Drexel University's Dr. Jin Wen, an Assistant Professor in the Department of Civil, Architectural, and Environmental Engineering who is actively involved with building HVAC systems, and Jameson Detweiler, a doctoral student in Civil Engineering and President of the Drexel Smart House, a "living laboratory" to test new technology and designs. Haworth Inc.'s project representative is Lisa Teman-Rosenburg, the company's Business Development Director.

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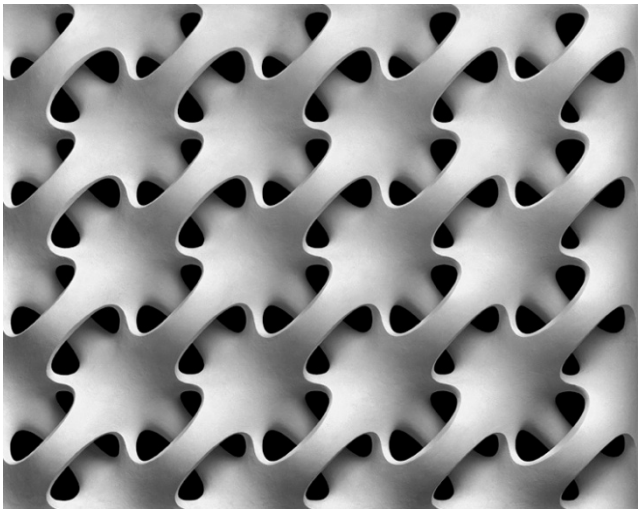
ReD: A Responsive Daylighting Panel Integrating Phase Change Material



Hauer, Erwin, http://www.erwinhauer.com/ (3 March 2008)

Impact: With energy prices constantly increasing and affecting economic conditions around the world, there is an increasing need for sustainable solutions to energy consumption. Energy use reduction can be accomplished by reducing the heat generated from sources of artificial light. Reducing this load can help minimize a building's operating costs, and provide a sustainable alternative to conventional window systems.

ReD is a responsive daylighting panel with phase change material embedded in a conductive and lightweight composite, which has the potential to illuminate interior building environments with ample sunlight without increasing the building's reliance on mechanical systems for heating and cooling. ReD will use a renewable energy source in the form of solar energy, thus diminishing the need for costly heating and cooling systems. Thermal comfort and quality of illumination will also be improved with the use of daylight.

Project Overview: The project team will design, build, and test a Responsive Daylighting Panel (ReD) prototype. In an age of growing environmental awareness, the benefits of daylight are in high demand, but there must be a way to include it without sacrificing thermal performance. In ReD, the embedded phase change material shifts from clear transparent to translucent white, allowing for daylight to pass through without heat gain. Consequently, the panel will have heat storage capacity similar to masonry construction, but within a thin modular building system. Large-scale commercial applications, such as office buildings, museums, and institutions, would benefit the most from this technology. This project will conduct experiments on the ReD technology and design prototypes. Based on preliminary research, the team anticipates that ReD will reduce heat losses by 30% and reduce solar heat gains by 50%; as compared to double-glazed window assemblies.

GBA Product Innovation Grant Amount: $20,000

Leadership Team: The Project team includes Temple University Architecture Professors Sneha Patel and Rashida Ng, who have expertise in the areas of material technologies, advanced fabrication, and sustainable building performance; the team also **includes** Villanova University Mechanical Engineering Professor Amy Fleischer, who has expertise in thermal management systems utilizing phase change material. Dr. Jon Zuo, founder of Advanced Cooling Technologies (ACT), is also affiliated with the project; ACT is a Lancaster-based company that specializes in advanced thermal technology development and custom product manufacturing.

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