

New green technology squeezes out building leaks

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Curtis Harrington, right, and student assistant Mari Thomsen from the UC Davis Western Cooling Efficiency Center prepare a blower door to test a new aerosol sealing technology. Credit: Paul Fortunato/UC Davis WCEC

(Phys.org) —A new building-sealing technology developed by researchers at the University of California, Davis, will get a real-world test today at a Habitat for Humanity home in Stockton, Calif.

Developed by scientists at the UC Davis Western Cooling Efficiency Center, the green technology is designed to take the guesswork out of sealing <u>building</u> leaks, which account for roughly 30 percent of the energy used to heat and cool a building.



Previous testing has shown that the UC Davis aerosol sealing technology can reduce available leaks by 50 percent. With further improvements, the researchers think it has the potential to bring leakage down to nearly zero.

The technology uses a compressed nitrogen system to push a sealant through five <u>nozzles</u>. Once sprayed into a pressurized environment, the sealant becomes a foggy mist of aerosolized particles. These particles move toward wherever air is escaping and seal the leak.

"Kind of like a race car run amok, the particles skid out of the air, hit the leak and stick," said project manager and Western Cooling Efficiency Center associate engineer Curtis Harrington.

"The technology has the potential to seal a building better, faster and cheaper than any manual process. It finds and seals the leaks for you—and, through a software system that tracks the sealing process, it provides automatic verification that it's sealed," Harrington said.

The system takes roughly one hour to seal a 1,200 square-foot home, identifying leaks that escape the <u>human eye</u>.

"And you don't have to have someone running around using a caulking gun," said WCEC assistant engineer Nelson Dichter.

Since April 2012, the UC Davis center has tested the technology in three new Habitat for Humanity homes in San Joaquin County and one retrofit home in Davis, Calif.

The California Building Code requires that all new <u>residential buildings</u> be zero net energy by 2020. The new UC Davis sealant technology could become a tool to help Habitat for Humanity and other builders reach that goal.



The new system builds on previous research by Western Cooling Efficiency Center Director Mark Modera, who developed a system to seal duct leakage with aerosol particles. The new technology uses a similar process to seal leaks in building envelopes—the outer shell of a building, such as the walls, doors and windows that separate the interior and exterior environments.

"The mission of the Western Cooling Efficiency Center is to reduce cooling energy use and peak power demand," said Modera, a UC Davis professor of civil, environmental and mechanical engineering. "However, when we see an opportunity to impact both heating and cooling, in this case by reducing excess air infiltration, we take advantage of it. Once we have worked out the kinks in single-family applications, we expect that this technology will have widespread applicability, not only in the buildings sector, but in many other situations in which a tight enclosure is desired."

While some ventilation is needed to maintain healthy indoor air quality, the UC Davis center's goal is to get the system to minimize leakage by as much as possible—ideally, to zero—and then adjust the system to account for ventilation needs.

The scientists primarily have focused on vacant, new buildings for the testing process to ensure the sealant does not seal or coat residents' belongings.

Once the seals are made and the building is flushed, the low-VOC sealant provides a safe environment for inhabitants. However, breathing aerosols while the sealant is being administered is not recommended. When entering the building during this time, installers wear appropriate respirators.



Provided by UC Davis

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