Building hurricane-proof roofs

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Credit: Florida International University

An FIU professor has a plan to get rid of the blue tarps that inevitably appear on rooftops after a hurricane.

Arindam Gan Chowdhury has patented a concrete roofing system that aims to replace the hundreds of individual shingles or barrel tiles, not to

mention thousands of nails as well as plywood sheathing and wooden trusses, that often put housetops at risk.

"Why have so many elements?" the civil engineer asks. "Any weak link creates a domino effect," with a small break or a misstep in installation potentially escalating into serious damage.

Chowdhury's solution: Replace all those components with a monolithic structure, in this case a series of conjoined concrete panels, each of which measures about 4 feet wide and up to 30 feet long and features an inch-thick wavelike pattern. The panels would be fabricated off site and then connected to one another atop a home using interconnecting joints before being secured to the building's masonry block via a steel strap or metal rod.

Manufacturing the panels in a factory allows for the kind of quality control that is often impossible with current roofing systems, the integrity of which depends largely on the skill of installers, Chowdhury explains. Labor costs for the concrete panel installation would likely be lower than those for traditional roofs as the work is expected to take less time. The price tag on the panel rooftop—constructed in the sloped shape common to homes—is comparable to the total cost of all materials that go into other roofs. And the heft of the panels is no greater than the combined weight of all the elements of a standard roof.

Chowdhury, who directs the NSF-funded Wall of Wind Experimental Facility, and his team have tested the innovation under simulated Category 5 wind effects with great success. "We have not had any failures," he says.

Designed with aesthetics in mind, the panels have the potential to be colored to fit a homeowner's tastes. A red dye, for example, can be infused into the concrete mixture before pouring to create a product that

resembles clay tiles. Chowdhury also has patented a system compatible with commercial flat-roof buildings. The university is in talks with companies interested in potentially manufacturing the technology.

Separately, Chowdhury has applied for a patent on a system of screw-like turbines that can be mounted to a building to interrupt the powerful vortices of air generated by strong winds as they travel up and over the roofline. Such vortices are responsible for ripping away tiles and shingles and even pulling off whole roofs as they create upward lift. For those who do not have in place the concrete roof panels Chowdhury has devised, the turbines might be the next best way to avoid destruction.

Provided by Florida International University

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