

THE WALL STREET JOURNAL.

TUESDAY, AUGUST 7, 2007

© 2007 Dow Jones & Company, Inc. All Rights Reserved.

From Fans' Whirlwind, Researchers Reap Data to Brace Homes

By LIAM PLEVEN
Miami

A FLORIDA UNIVERSITY and an insurer that incurred hundreds of millions of dollars in losses during recent hurricanes are teaming up to find ways to help buildings survive massive storms.

Their tool: Giant fans.

The Wall of Wind, as it's been dubbed, looms over a field at Florida International University. Six fans, stacked 16 feet high with each hooked up to a powerful motor, create gusts of well over 100 miles per hour. The wind is strong enough to tear shingles off the roof of a model home, rattle the front window in its frame, and turn a decorative wind chime into a missile.

The wind lab is part of an effort to find the least expensive ways to reinforce millions of homes and commercial structures that went up before stricter building codes were adopted. Researchers at Florida International and an affiliate of RenaissanceRe Holdings Ltd., a leading catastrophe insurer, are exploring how hurricane winds attack vulnerable parts of a building—such as where the roof meets the walls—and testing devices that may help protect them.

"We've got to find a way to retrofit existing buildings," says Stephen Leatherman, director of the International Hurricane Research Center at the university, which is public.

In the U.S., losses caused by hurricanes in 2004 and 2005 were likely well over \$150 billion, with about \$82 billion covered by insurance companies. Research could eventually help cut property losses by 10%, says William Riker, president of RenaissanceRe, a Bermuda-based firm that's a major seller of reinsurance—essentially insurance for insurance companies that want to spread the risk of claims from major disasters. RenaissanceRe posted a net loss of \$281 million for 2005, largely because of payments related to hurricanes Katrina, Rita and Wilma.

Insurance markets have been in turmoil in hurricane-prone states. Insurers have been raising rates and limiting the number of policies they sell in coastal communities. State lawmakers,



WeatherPredict Consulting Inc.

meanwhile, are pushing insurers to give better deals to consumers who take steps to reduce their vulnerability to hurricanes.

Louisiana recently passed a law requiring insurers to offer savings to customers who make changes such as reinforcing their roofs. In May, Connecticut mandated lower premiums for policyholders who install storm shutters or impact-resistant glass.

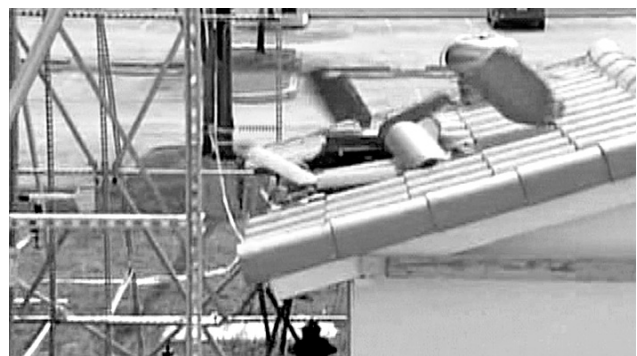
Data on whether inexpensive retrofits can significantly reduce storm losses is still limited. In part, that's because the science of understanding how hurricanes wreak their havoc is in its infancy.

"You're never quite sure what failed first," Mr. Riker says. "Nobody stands outside in a hurricane and watches how a building falls apart."

At Florida International University, **giant fans** are used in hurricane research.

The Wall of Wind, which started with a two-fan machine in late 2005, is designed to make something close to that possible. The six-fan unit went into operation in May.

Most research into wind damage from hurricanes is conducted on miniature structures, in small wind tunnels. The University of Western Ontario is planning



WeatherPredict Consulting Inc.

Gusts created by the Wall of Wind **tear off roof tiles** during a test

(over please)

THE PUBLISHER'S SALE OF THIS REPRINT DOES NOT CONSTITUTE OR IMPLY ANY ENDORSEMENT OR SPONSORSHIP OF ANY PRODUCT, SERVICE, COMPANY OR ORGANIZATION.
Custom Reprints (609)520-4331 P.O. Box 300 Princeton, N.J. 08543-0300. DO NOT EDIT OR ALTER REPRINT/REPRODUCTIONS NOT PERMITTED #32842

DOW JONES

next year to start testing full-scale structures using suction pressure rather than mimicking wind. James Cook University in Australia has a cyclone testing facility.

Insurers are convinced of the value of such tests. Similar experiments on car collisions have led to changes that have cut the number of deaths and reduced property damage, says Robert Hartwig, president of the Insurance Information Institute, a trade group. "We would expect to see similar benefits in home design," he says. Such research could also help insurance companies better predict hurricane losses.

RenaissanceRe has committed \$1 million to help build the wind lab in Florida, which tests structures the height of single-story buildings. At full strength, it generates winds of 130 miles per hour, tightly aimed at the test building. Category 5 hurricanes have winds above 155 miles per hour, though the actual wind speed is typically lower at ground level.

Florida International plans to expand the unit to 24 fans soon, moving it into a large metal building being constructed on campus, with two ends that open like an airplane hangar. It will be able to test two-story structures. The state of Florida is contributing \$2 million to the effort.

Research is just beginning to produce results.

One focus for researchers at the wind lab are the destructive vortexes that hurricane winds create at the corners of buildings. The swirl along roof edges can tear off a roof, leading to significantly more damage to a structure and its contents.

On a recent test-run, as observers watched atop a nearby trailer, technicians cranked up the fans until winds of about 125 miles per hour were punishing a modest structure. A wind chime flew away, but only a couple of clay tiles at the roof line came off—the kind of minor damage that might lead homeowners in the path of a massive hurricane to count their blessings.

"Not what I would have expected," said Craig Tillman, president of WeatherPredict Consulting Inc., which is indirectly owned by RenaissanceRe.

The fans were turned off and workers loosened some tiles, re-creating the effect of shoddy construction or average wear and tear. When the fans were turned on again, the difference was dramatic. A few tiles flew off quickly and more followed—in a few minutes a section of the roof looked severely damaged.

"We learned something today," Mr. Tillman said. "Workmanship matters."

Later, workers using a crane positioned a structure with a graveled flat roof, similar to those on many commercial buildings, in front of the fans. Hurricane winds sweeping over a building's edge can wipe away the gravel and expose the waterproof membrane underneath. If that is torn off and water gets inside, losses escalate sharply.

Researchers at the Wall are examining ways to minimize that effect. Jason Lin, an engineer and WeatherPredict executive, has patented a metal grate a few inches high that essentially pulls wind up from the roof edge, letting it flow through small holes. In this test, when the grate was attached and the fans were turned on, the gravel barely moved.

Researchers also hope to look at ways to protect air-conditioning units on the roofs of commercial buildings, which can be vulnerable in hurricanes, and at different types of inexpensive trusses that might help bolster a slanted roof.

"This is not going to make homes survive Category 5 winds," says Mr. Tillman. "But if you can get structures to withstand a Category 3 event, you've actually accomplished quite a bit."