

NOAA & ORNL

Unveil Powerful New Tools For Investigators

RICOWI SEMINAR

BY PHIL DREGGER, PE, RRC, FRCI

H*Wind and WUFI, two new powerful tools now available for use by roof professionals at no cost, were demonstrated to a group of more than 80 participants as part of the Roofing Industry Committee on Weather Issues (RICOWI) seminar on March 13 in conjunction with the RCI Convention in Tampa, Florida. H*Wind is the National Oceanic and Atmospheric Administration's (NOAA) newly developed web-based source of real-time hurricane wind speeds. WUFI is the Oak Ridge National Laboratory/Institute of Building Physics' (ORNL/IBP) computer program for modeling moisture movement and accumulation in roofs and walls.

H*Wind NOAA

When Hurricane Andrew hit Florida in 1992, roof professionals investigating hurricane damage needed to wait months for reliable information about wind speeds as data from various sources were downloaded, interpreted, and combined to create wind speed maps (wind fields). Starting this summer, according to Mark Powell, NOAA, investigators need only to log onto www.aoml.noaa.gov/hrd/data_sub/wind.html within a couple of hours of when a hurricane makes landfall in order to download wind field maps created by the H*Wind program. Interpolating between wind isotach lines can project wind speeds at specific building locations. See Figure 1.

The H*Wind tool was developed by detailed analysis of wind data gathered from several different sources during large hurricanes. Data from reconnaissance aircraft, buoys, ships, land-based anemometers, satellites, and instruments dropped into the storms (GPS Sondes) were correlated and integrated to develop algorithms used to create the wind field maps.

Archival Wind speed information is also available at the NOAA web site.

WUFI ORNL/IBP

Moisture accumulation in roofs and walls causes billions of dollars of property damage each year. Historically, roof professionals needed to rely on rule-of-thumb type guidelines or analytical procedures based on steady state conditions when designing roofs and walls to avoid excess accumulations of moisture. Now, according to André Desjarlais, ORNL, roof professionals who are U.S. citizens can now log on to www.ornl.gov/btc.moisture and download WUFI ORNL/IBP, a computer program that models movement of water and water vapor under real-life weather and climate conditions (i.e., transient hydrothermal model).

The WUFI program allows designers to check moisture accu-

mulation in roofs and walls made up of a wide variety of construction materials and can model conditions as they change and develop over months and years. Originally developed for walls, the program can now be used for roofs by setting the construction orientation to horizontal. According to Desjarlais, "snapshots of the WUFI program output screens can be inserted into reports or video files that can be inserted into PowerPoint® presentations. See Figure 2.

Seminar Attendance Tops 75

In addition to the above, assembled roof professionals heard technical presentations by Thomas Smith, "Performance of Sprayed Polyurethane Foam (SPF) Roof Assemblies"; Reese Moody, "High Wind Design Considerations of Clay and Concrete Tile"; Lisa McIlvoy, "Understanding the ANSI/SPRI Roof Edge Code"; David Cox, "Wind Loss Investigation"; and from Greg Brandt, "ASCE 7 - The 2002 Edition." The seminar concluded with a tour of the

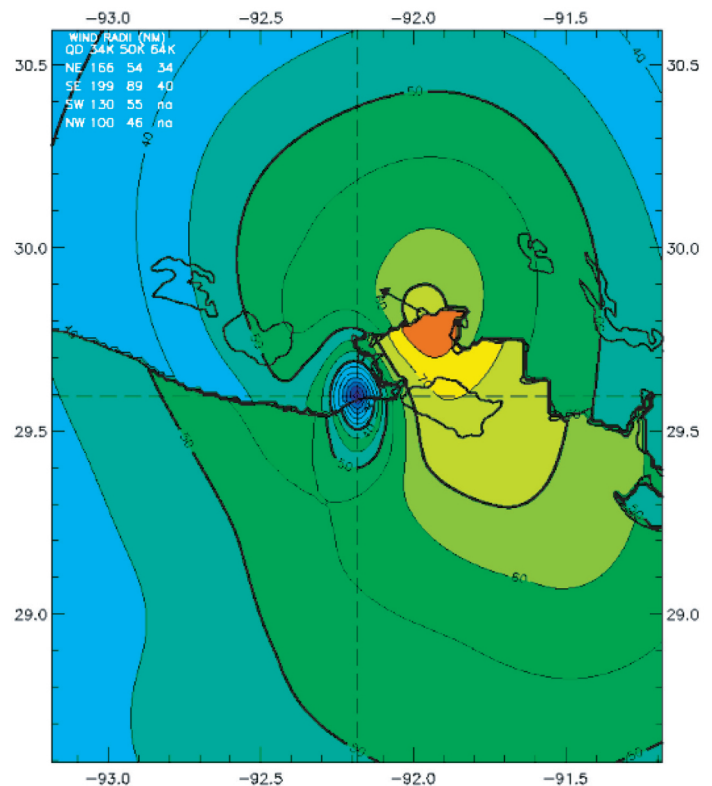


Figure 1: H*Wind Map of sustained surface winds (kts) as Hurricane Lili makes landfall on October 3, 2002.

Institute for Building and Home Safety (IBHS) and the Museum of Science & Industry. See *Photo 1*.

Excerpts from the technical presentations of interest to this author follow. The reader is directed to the indicated source of the information for needed clarifications. Readers are also encouraged to attend future RICOWI seminars to benefit first hand from the wealth of information presented that can only be hinted at by the excerpts cited.

Tom Smith, TSmith Consulting

- Adding sprayed foam to a roof system inherently strengthens its wind resistance on the order of 25% to 30%. FM Global testing of example roof systems indicated wind resistance increased from 31.2 psf to 41.6 psf in one case and from 60 psf to 75 psf in another merely by spraying foam over the surface.
- The “300 people” reference in the ASCE 7 Occupancy III category refers to buildings where 300 people can assemble in one room. It does not refer to buildings where 300 or more people can assemble in multiple rooms.

Reese Moody, Roof Tile Institute

Charts in the *Roof Tile Institute Manuals* indicating uplift capacity for various tile attachment systems include a factor of safety of 2 to accommodate variations in workmanship and/or materials. Moody also clarified that the charts addressed plywood decks only; the information is not necessarily applicable to OSB roof decks.

Lisa McIlvoy, W.P. Hickman Co.

The ANSI/SPRI ES 1-98 is referenced in the 2001 revision of the 2000 International Building Code and represents the first time a roof edge metal standard has been adopted as part of a code standard.

David Cox, FM Global

- The proposed FM Global contractor approval program has been put on hold indefinitely.
- FM Global wind uplift testing and approvals incorporate a theoretical factor of safety (FOS) of 2. However, allowable variations in placement of insulation fasteners (6" to 12" from board edges) can “use up” much of this FOS. For example, a roof system originally tested with the insulation boards attached 6" from the edges may sustain a test load of 135 psf, but sustain a test load of only 90 psf when tested with fasteners installed 12" from board edges. Accordingly, the “approved” roof

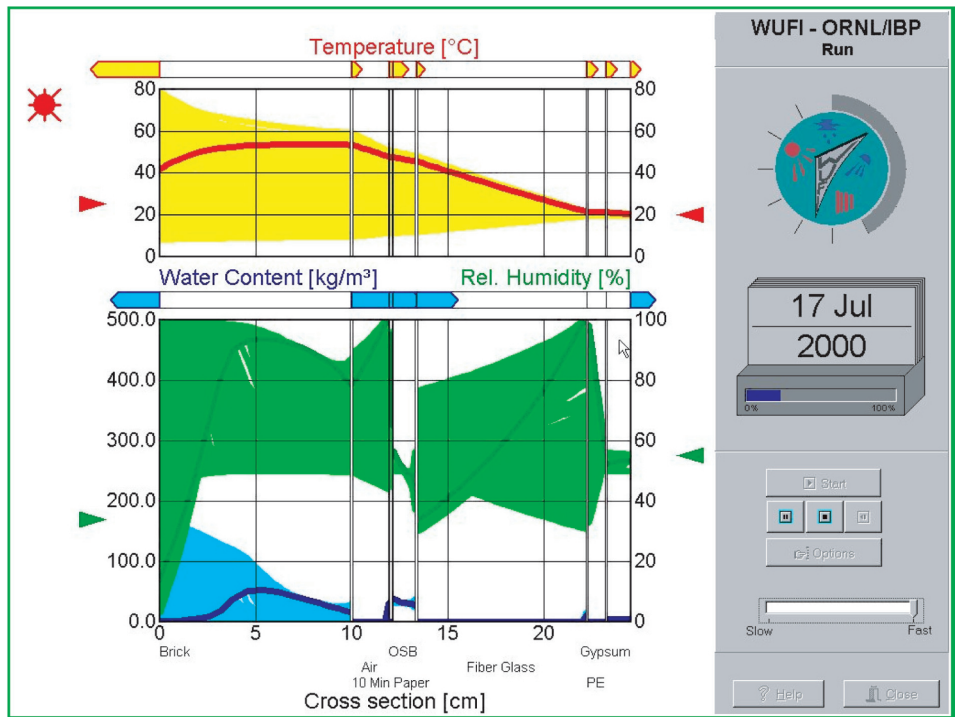


Figure 2: WUFI Output Screen for a typical wall consisting of brick veneer, air space, OSB sheathing, fiberglass insulation, and gypsum wall board.

system now in the field with fasteners positioned 12" from board edges may only have a FOS of 1.33.

Mark Powell, NOAA

- 1992 Hurricane Andrew was recently reclassified from a Category 4 to a Category 5 hurricane.



Photo 1: RICOWI members visited the Institute for Building and Home Safety and the Museum of Science & Industry.

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- To help answer questions that sometimes arise regarding wind exposure conditions at Automated Surface Observing System (ASOS) sites, photographs of 220 coastal marine ASOS sites are now available for review on-line at www.ndbc.noaa.gov.

Greg Brandt, Firestone Building Products, SPRI

Changes from the 1998 version of ASCE 7 to the 2002 version include:

- Ocean front property along hurricane coasts is now considered Exposure C (not Exposure D).
- Procedures for determining loads on roof top equipment are now provided.
- Procedures for determining loads on parapet walls are now provided.
- Critical facilities must include glazing protection. The option to consider them as partially enclosed has been omitted.

RICOWI Board Meeting

The RICOWI Board discussed revisions to the Hail Investigation Program (HIP) Strategic Plan. Patterned after the RICOWI Wind Investigation Program, the HIP mission statement is to:

- Investigate the field performance of roofing assemblies after major hailstorm events,
- Factually describe roof assembly performance and modes of damage, and to
- Formally report the results for substantiated hail events.

The revised HIP plan was sent to RICOWI sponsoring members for final balloting by May 31, 2003. If approved, HIP will be ready to field investigation teams this summer.

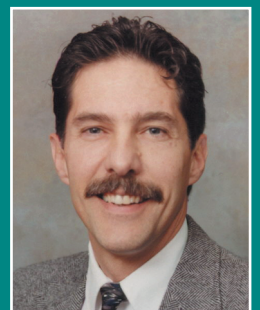
RICOWI Seminars and Membership

The 2003 RICOWI Fall Seminar will be held on November 13, 2003 at Oak Ridge National Laboratory. The 2004 RICOWI Spring Seminar will be held in conjunction with the RCI International Convention on March 26, 2004 in Reno, NV.

Individuals interested in becoming Affiliate members of RICOWI and attending RICOWI seminars and general meetings should contact RICOWI Executive Director Patty Wood-Shields for additional information by phone: 770-914-7235, by fax: 770-915-7102 or by e-mail: pawsroof1@aol.com.

ABOUT THE AUTHOR

Philip Dregger, PE, RRC, FRCI, is RCI's Sponsor Member representative to RICOWI. He is a former Region Director and is a Fellow of the Institute. Dregger is president and a senior consultant of Technical Roof Services, a roofing and waterproofing firm in Martinez, CA. He has lectured extensively to contractor, insurance, consultant, and manufacturer groups, sharing lessons learned from years of roof investigation. Dregger is the author of several articles on roof technology.



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