



American Association  
for Wind Engineering

AMERICAN ASSOCIATION FOR WIND ENGINEERING

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# THE WIND ENGINEER

NEWSLETTER OF AMERICAN ASSOCIATION FOR WIND ENGINEERING

March 2003



Testing at INEEL Severe Weather Test Site  
in Wyoming - see story on p. 3

## Past AAWE President Michael Gaus's Message

The time has come for a new team to take over the direction of AAWE and the transfer of responsibilities took place on April 1, 2003. The new team, headed by Dr. Bo Bienkiewicz has had a long track record of accomplishments in wind engineering and will continue to mount an effective program to advance wind engineering and wind hazard mitigation.

Looking back over the past several years AAWE has worked toward improving wind engineering knowledge and application. Activities have included the publication of the Newsletter, operation of a web site, sponsorship of the Americas Conference on Wind Engineering in 2002 and the planning for the next conference in 2004, interaction with other professional organizations in the U.S. and abroad, interaction with Congress to encourage the introduction of a bill to improve support for wind engineering activities and giving presentation to different organizations and the start of activities to make wind engineering information available on CD-ROM's and other publication media.

There is yet much to be done to improve the knowledge base and applications in wind engineering including improving the collection of field information, improving support for the university research infrastructure, better

evaluation of the needs for analysis and testing for both fluid mechanics and structural resistances, improving computer software for wind analysis, development of viable computational fluid mechanics capabilities for analyzing turbulent wind flows, more consideration for non-structural issues such as water penetration, improved knowledge on ways to reduce missile generation sources, improved methods to analyze and predict the economic consequences of wind mitigation decisions, methods to improve wind engineering education, how to more effectively cope with retrofit issues that must be considered to make significant impacts on shorter-term loss reductions, and the probable need for full-scale testing to fully understand the behavior of low-rise structures that account for a large proportion of losses in wind storms. No doubt much more could be added to this list.

From the above it can be seen that there is much yet to be done and the new officers and board will be working toward achieving some of these goals with the aid of AAWE members.

The past presidents of AAWE and past board members will be available to lend assistance in using their experience in working toward achieving desired goals and will not simply fade off into the distance.

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## New Officers of AAWE, 2003 - 2004

### PRESIDENT

**Bogusz (Bo) Bienkiewicz**, professor of Civil Engineering and Director of Wind Engineering and Fluids Laboratory, Colorado State University. For over 25 years he has been involved in fundamental and applied wind engineering research. He has been a strong proponent of establishment of the National Wind Hazards Reduction Program (NWHRP) and strengthening of national and international collaborative wind engineering research and technology transfer focused on mitigation of adverse effects and harnessing of benefits of wind. In his new position at AAWE he intends to focus his effort on the above areas and on enhancing the stature of AAWE through membership growth, collaboration with other professional organizations, service to professionals in wind engineering and related disciplines, legislative and regulatory entities, as well as national and regional authorities.

### PRESIDENT ELECT

**Dr. Levitan's** primary interests are in wind and hurricane hazard research and education, including wind effects on industrial/petrochemical facilities and hurricane shelter assessment/design. Recent accomplishments include founding the LSU Hurricane Center and leading a large team of faculty on a major NSF award to create a new discipline called Hurricane Engineering. Prior to joining LSU, he served for 5 years as the first Managing Director of the Wind Engineering Research Field Laboratory at Texas Tech. Professional activities include service on the ASCE 7 Wind Committee, ASCE Wind Effects Committee, ASCE National Research Policy Committee, and new ICC/NSSA Shelter Standards Committee.

### BOARD OF DIRECTORS

**Tony Gibbs** is Past President of The Barbados Association of Professional Engineers, Past Vice President of The Institution of Structural Engineers (UK), Fellow of The Institution of Civil Engineers (UK) and Fellow of The American Society of Civil Engineers. Mr Gibbs is adviser to the Council of Caribbean Engineering Organizations on natural hazards and was technical monitor for the development of the Dominican Republic wind loads standard. In 1991 he received (at the US National Hurricane Conference) the International Award "For (his) Very Significant Contributions to Hurricane Loss Reduction and Hurricane Safety in the Caribbean".

**Nicholas P. Jones** is Professor and Head, Department of Civil and Environmental Engineering at The University of Illinois at Urbana-Champaign. After graduating from the University of Auckland (NZ) with a BE (Hons) in Civil Engineering, Dr. Jones attended Caltech, obtaining an M.S. in 1981 and a Ph.D. in 1986. His research interests include various aspects of structural dynamics, system identification, flow-induced vibration, and wind engineering. He chaired the 8<sup>th</sup> US National Conference on Wind Engineering in June 1997, and co-chaired the 13<sup>th</sup> ASCE Engineering Mechanics Specialty Conference in June 1999. He is the editor of the Journal of Wind Engineering and Industrial Aerodynamics.

**Dr. Chris Letchford** oversees research involving model-scale testing as part of the Wind Science and Engineering Research program at Texas Tech University. Research is conducted in the boundary layer wind tunnel and the newly developed downburst and tornado simulators. Dr. Letchford teaches undergraduate Fluid Mechanics and postgraduate Wind Engineering courses. Dr. Letchford served as President of the Australian Wind Engineering Society from 1995-1999 and was a working member of the wind loads section of the Standards Australia Committee, which produced the 2002 edition of that code. He currently serves on three ASCE Committees - Aerodynamics, Tall Buildings and Wind Effects.

**Mark D. Powell** is an atmospheric scientist for NOAA's Hurricane Research Division (HRD), located at the Atlantic Oceanographic and Meteorological Laboratory (AOML) in Miami, Florida. He began his NOAA career in 1978 with the National Hurricane Research Laboratory (now HRD). His active research areas include boundary layer wind structure and forecast accuracy in landfalling hurricanes, hurricane rainband thermodynamics, and standards for the measurement and archival of surface winds. He is currently leading a project on real-time hurricane surface wind analysis and hurricane risk modeling.

**Thomas L. Smith**, AIA, RRC, CSI: Tom is a licensed architect and a registered roof consultant. He was elected to the AAWE Board in 1998. He has been a member of the ASCE 7 Wind Loads Task Committee since 1990. He has served on several FEMA building performance assessment teams, has authored numerous papers on wind performance of roof systems, authored wind design guides, and is engaged in high-wind design practice.

**Ted Stathopoulos** received his Civil Engineering Diploma from the National Technical University of Athens, Greece and both his M.E.Sc. and Ph.D. from the University of Western Ontario. He is currently Professor at the Department of Building, Civil and Environmental Engineering and Associate Dean of the School of Graduate Studies at Concordia University, Montreal, Canada. His research in the area of wind effects on buildings and their codification has been influential in the development of codes and standards around the world. He serves on the ASCE Standards Committee of Minimum Design Loads of Buildings and Other Structures and chairs the Wind Effects Committee of the Structural Engineering Institute of ASCE. He is a professional engineer registered in Québec, Ontario and in Greece. He is a Fellow of the Canadian Academy of Engineering and a Fellow of the American Society of Civil Engineers.

### PAST PRESIDENT

**Michael Gaus**, consultant, Professor Emeritus, State University of New York at Buffalo, former Director of the Critical Engineering Systems Division in the Directorate for Engineering, National Science Foundation.

## INEEL Severe Weather Test Site in Wyoming

*By Cheryl O'Brien, Bill Richins and Tom Larson*

Rental cars stuck in snow drifts. Workers digging trenches in 40 mph winds. Instruments fried by lightning. Hotdogs from the Arlington store – the only food in 40 miles. And 300 head of elk spotted across the draw. This, in brief, is the INEEL test site experience.

It sounds like a harsh place. And it is.

In fact, when the Idaho National Engineering and Environmental Laboratory (INEEL, a U.S. Department of Energy science and engineering laboratory), and the University of Wyoming established this test site 50 miles west of Laramie in 1997, the main attraction was the promise of 80 mph wind gusts at least twice a year.

The researchers here have not been disappointed.

The 10-meter anemometer tower on the test site has tracked multiple periods with 80-90 mph gusts over the past two years, usually during the winter months. Temperature varies annually from –30 to more than 90 Fahrenheit.

The site's purpose is to collect data on the response of full scale structures and buildings to naturally occurring wind and simulated loads. Research scientists, engineers and students are testing manufactured housing and conventional construction against natural and manmade pressure loads on walls, roofs and windows, using the latest sensors and instrumentation to measure load transfer and displacements. Ultimately, the research will yield a finite element analysis tool customized for the nation's manufactured housing industry.

The most ambitious project – among several now using the site – is a manufactured housing test sponsored by the Department of Housing and Urban Development (HUD) and the Manufactured Housing Institute.



*Figure 1. Load cells installed at the marriage line of this double-section test home will provide wind load transfer data*



*Figure 2. Air bag positioned between a strong wall and the test home, pressurized to 30 psf, to evaluate baseline global displacements*

The research findings will be of significance. Some 22 million Americans (about eight percent of us) live full-time in manufactured homes. Double-section homes have outpaced single-section homes in recent years, with the average occupancy remaining steady at 2.4 people (and 0.5 dogs).

“Manufactured housing” is the industry term for

some very distinctive products. These are homes that meet the structural and safety requirements of the HUD Code (Federal Manufactured Home Construction and Safety Standards, 24 CFR 3280). (The term “mobile home” is no longer used.) Manufactured housing is the only residential construction governed by a national code rather than local jurisdictions.



*Figure 3. Data from point loads up to 3500 lbf applied just below the eave of the west exterior wall to be compared to FEM results*

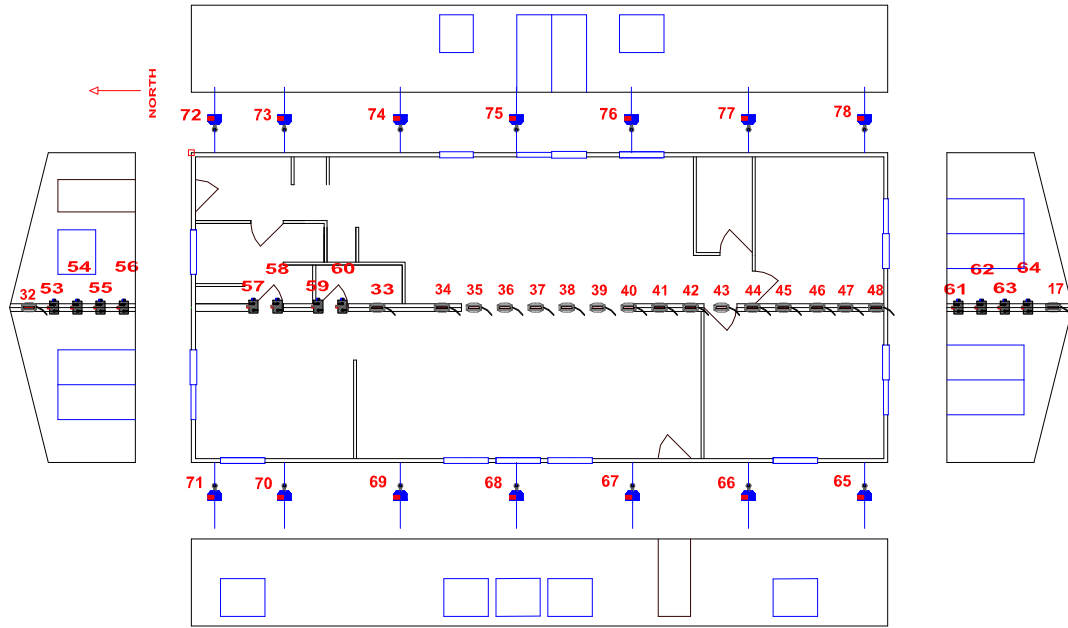


Figure 4. Tiedown, floor and wall load cell locations

HUD has responsibility for maintaining and enforcing this code. The INEEL test project was funded to better understand the basic holistic structural performance of manufactured housing, especially in high winds. In addition, the project is developing the previously mentioned analysis tool customized for the industry.

A single-section Oakwood model home – the first to be tested here – yielded valuable information. Then last fall INEEL, students from University of Wyoming and Idaho State University, and MAMTC installed, instrumented, and tested a second manufactured home.

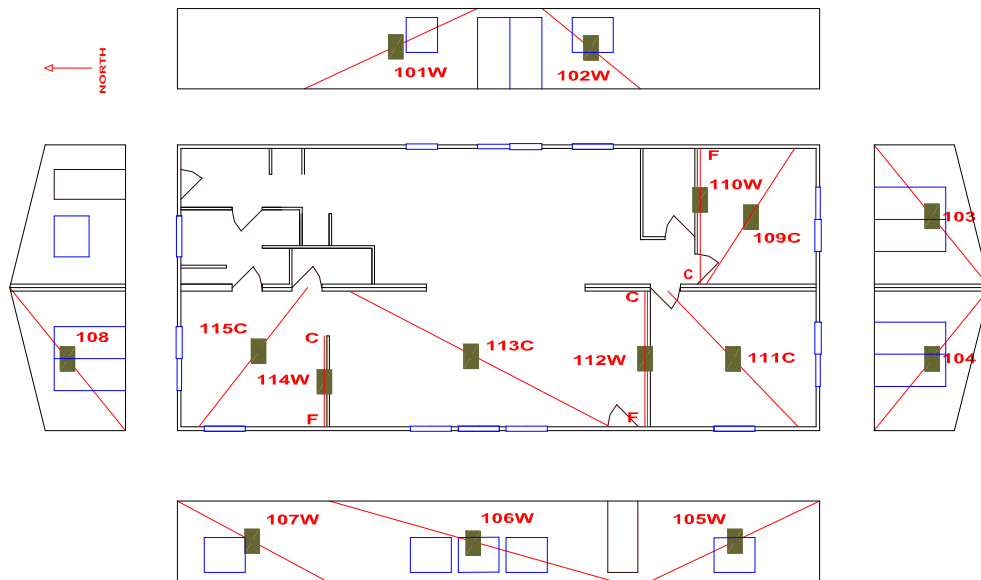


Figure 5. Racking displacement instrumentation locations



Researchers hope that the analysis of the data will reveal new insight into the performance of manufactured housing, particularly the transfer of load through the marriage line. The results will arm HUD with information needed to improve the HUD Code, and the industry with the means to design to performance requirements.

The INEEL test site is remote and windy – but the research partners knew that from the start. In fact, the wind history was available from the Foote Creek Rim wind farm installed on the same property. But even with the more-than-occasional gust, it's a great place to visit. If you show up for a tour, you might be invited to stay for one of Bill and Tom's dutch-oven dinners. So bring your windbreaker, and come on out.

**Note:** Bill Richins and Tom Larson are Co-principal Investigators for wind research projects at INEEL. Cheryl O'Brien is Department Manager for Building Technologies and Energy Management at the INEEL. For further information, contact Cheryl O'Brien at (208) 526-4105, cco@inel.gov).

## Wind Engineering Information on CD-ROM's

*By Mike Gaus*

AAWE has started a new activity that is aimed at making wind engineering information conveniently available to AAWE members. Our first trial for this program is to make available three selections on CD-ROM discs that should be of interest to many of our members.

The first selection is a **NEW CD** that has just become available and contains all of the papers presented at the Americas Conference on Wind Engineering-2001 that was hosted by Clemson University and is one of a series of Conferences sponsored by AAWE. The CD disk contains the full text and graphics for the papers from the Conference along with supplementary information. All of the material is presented in Adobe Acrobat format that should make it possible to read and print the material from

most computer platforms. The total number of pages of material on the CD exceeds 1100. The CD is available to members of AAWE for \$25.00 and to nonmembers for \$35.00.

The second is a CD that was prepared in connection with the 8th U.S. National Conference on Wind Engineering that was hosted by the John Hopkins University in 1997. This CD contains papers, abstracts and other useful information from the Conference. All material is presented in an Adobe Acrobat format that should make it possible to read and print the material from most computer platforms. This CD is available to AAWE members for \$25.00 and to nonmembers for \$35.00.

The third item is an educational CD that was prepared by the Wind Science and Engineering Center at Texas Tech University. This CD was initially prepared to enhance classroom teaching of wind engineering but is equally useful for self-paced instruction and for short courses. The CD contains the following four modules: (a) An Overview of Tornadoes, Hurricanes and Thunderstorms; (b) Damages Caused during Tornadoes and Hurricanes; (c) Impact of Wind-Borne Debris; and (d) Wind Loading on Low-Rise Buildings. The CD contains text, slides, videos and animation to illustrate various aspects of wind engineering problems. This CD is available for a charge of \$25.00.

The CD-ROM's should run on most Windows-based computers and the nominal charge covers the cost of reproduction, labeling, mailing and handling. Initially there is no premium being charged to mail to a foreign address. For further information on this new activity, which we hope to expand in the future, go to the AAWE web page, [www.aawe.org](http://www.aawe.org) and click on the "publications" box on the left side of the introductory screen, and select "CD ROM based Wind Engineering Publications". Order forms in an Adobe Acrobat format can be selected and printed for each of the CD-ROMs. The order forms provide space for entering mailing information and instructions on where to mail the form and how to make out checks. At the present time there is no provision for credit card payments although this option is being investigated. Payment must be in US funds.

## Mitigating Housing Losses in Extreme Natural Events

*By Lizeanne St. Pierre, M.E.Sc.*

A two-day workshop was held in Toronto, Canada on Dec. 3 & Dec. 4, 2002 on the subject of Mitigating Housing Losses in Extreme Events. The meeting was held in the Royal Sun Alliance Insurance Company building and was sponsored by the Institute for Catastrophic Loss Reduction, the Canada Mortgage and Housing Corporation and the University of Western Ontario.

The Workshop was organized around four major themes:

- Testing of Load Paths in Full-Scale Houses
- Earthquakes and Houses
- Wind Loads on Houses
- Serviceability Issues for Housing

and included a panel discussion and several special speakers.

Twenty-three presentations were made on these themes that covered issues such as loadings, resistance, water penetration, meteorological issues, economic and organizational issues for full-scale testing and discussions on possible future directions.

An example of a subject included in the presentations was information on the full-scale testing being conducted at the Cyclone Testing Station at James Cook University in Australia, one of the few places in the world where such studies have been conducted. The photo below, taken from Prof. David Henderson's presentation shows one of the full-scale experimental facilities in Australia.

Participants at the workshop indicated that full-scale testing is a vital element in gaining an understanding of the true load paths and system-resistance of low-rise structures subjected to extreme natural event loadings. As such testing is relatively expensive compared to the amounts countries seem to have been willing to invest in improving the knowledge base needed to reduce losses of housing and low-rise structures from extreme natural events, there was some discussion regarding how to plan and finance an improved program (*continued on p. 11*)



*Figure 1. One of full-scale experimental facilities in Australia*

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**American Association  
for Wind Engineering**

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**American Association  
for Wind Engineering**

## **OBJECTIVES**

The American Association for Wind Engineering (AAWE) was established in 1966. The objectives of AAWE are: (1) the advancement of the science and practice of wind engineering and (2) the solution of national wind engineering problems through transfer of new knowledge into practice.

## **CURRENT OFFICERS**

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**Past President:** M. P. Gaus (Gaus Associates)

## **WHY YOU SHOULD JOIN:**

AAWE provides networking opportunity with U.S. wind engineering community through regular and special publications, e-mail communication, internet resources, and technical meetings.

## **HOW TO JOIN**

Fill-in the Membership Application/Renewal Form and forward it to American Association for Wind Engineering, P. O. Box 161, Fort Collins, CO 80522-0161, USA. For more information visit AAWE web site or contact B. Bienkiewicz ([bogusz@enr.colostate.edu](mailto:bogusz@enr.colostate.edu), ph: 970-491-8232) or Marc Levitan ([levitan@hurricane.lsu.edu](mailto:levitan@hurricane.lsu.edu), ph: 225-578-4445).

Get involved in formulating  
National Wind Hazard Reduction Program

Please Post

and the need to share information on an international basis.

Proceedings of the Workshop have been published on a CD-ROM that makes extensive use of the Adobe Acrobat pdf format and should therefore be viewable on virtually all computer platforms.

Information on obtaining a copy of the CD-ROM containing the Proceedings can be obtained by contacting:

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## Hurricanes - What is Predicted for Year 2003?

*(from AAWE website at: [www.aawe.org](http://www.aawe.org))*

For the past 20 years seasonal hurricane forecasts have been presented by Prof. William Gray and his colleagues from Colorado State University. This year is no exception and a summary of his prediction for year 2003 is as follows:

- The 2003 Atlantic Hurricane Season will be an active one
- Prediction is for 8 hurricanes (average 5.9)
- Prediction is for 12 named storms (average 9.6)
- 65 named storm days (average 49)
- 35 hurricane days (average 24.5)
- 3 intense hurricanes (average 2.3)
- 8 intense hurricane days (average 5.0)
- Hurricane Destruction Potential, HDP, of 100 (average 71)
- Probability of U.S. major hurricane landfall is estimated to be 30 percent above the long-term average

- Atlantic Basin Net Tropical Cyclone (NTC) activity in 2003 to be about 140 percent of long-term average.

Predictions are made using 52 years of past data. More information about this forecast is available at <http://tropical.atmos.colostate.edu/forecasts/index.html>.

## International Conference on Wind Engineering, 11ICWE

*(from AAWE website at: [www.aawe.org](http://www.aawe.org))*

The 11th International Conference on Wind Engineering will be held in Lubbock, Texas, during the period June 2 through June 5, 2003. As the Conference date is rapidly approaching, it is hoped that all persons interested in Wind Engineering and associated disciplines are making plans to attend. An active organizing committee has been hard at work making plans and arrangements for the Conference and the committee members are open to suggestions on ways to make this Conference a great success.

A web site has been established for the ICWE Conference. It can be accessed at: [www.icwe.ttu.edu/Default.asp](http://www.icwe.ttu.edu/Default.asp).

Many abstracts have been received for papers to be considered for the Conference. Arrangements were made to accept abstracts electronically and the same procedure has been used to receive the papers that had been accepted. This makes it possible to provide technical papers and other information on-line.

An initial program of the conference has been posted on the ICWE web site and it will be expanded as conference plans are finalized.

Following the conference, authors will be free to submit their papers to the journal of their choice. No journal submittal of conference papers as a group is planned.

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**Established in 1966**

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