

Wall of Wind Full-Scale Hurricane Simulation and Testing

Report Submitted To: **The Roofing Industry Alliance for Progress (Mar '09)**

Progress of the 12-Fan Wall of Wind System:

Florida International University (FIU) wind engineering team (Laboratory for Wind Engineering Research - LWER) is developing the final phase of the full-scale “Wall of Wind” (WoW) facility. This final phase with twelve electric fans is being designed and will be controlled by Variable Frequency Drives (VFD); this phase, supported by the State of Florida and The Roofing Industry Alliance for Progress, is expected to be completed by the Summer of 2009. This 12-fan WoW is designed to generate Category 4 hurricane wind speeds. The various stages of the 12-fan WoW development are described below.

1. WoW Building (100 ft x 80 ft x 35 ft, Fig. 1a) has been completed and incorporated with a programmable turntable (16 ft dia, Figs. 1b, 1c) to test building models under different wind directions.



Figure 1. (a) WoW building, (b) WoW turntable pit, (c) WoW turntable

2. Computational Fluid Dynamics (CFD) simulations for 12-fan WoW are being carried by FIU's consultant RWDI. Initial results (Fig. 2) show that the 12-fan WoW system will be able to generate wind speeds above 140 mph (sustained winds). This will allow realistic testing of building components including various roofing

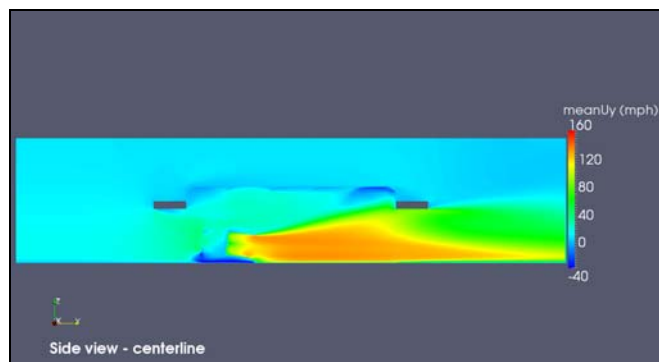


Figure 2. CFD simulation of 12-Fan WoW

products under Category 4 wind conditions in presence of severe wind-driven rain.

3. Factory Acceptance Test (FAT) of the new electrical fans (Fig. 3) has been conducted at Grand Junction, Colorado, on March 9, 2009. The results were satisfactory as a flow rate of 240,000 cfm with 15 in. of total pressure was achieved. The 12 fans are expected to be manufactured and delivered at FIU by May 2009.



Figure 3. WoW electrical fan (picture taken at Grand Junction, Colorado)

4. Variable Frequency Drives (VFDs) have been ordered from Toshiba. Each VFD is going to control 6 fans and will have the flexibility of running the fans as different rpms thus varying the wind speed. The VFDs are expected to be delivered in May 2009.
5. Consultancy works for design of structural frame to hold the 12-fans system (Fig. 4), noise suppression, debris suppression, electrical work, safety, data acquisition, etc. are underway. The 12-fan WoW system is expected to be operation by Summer 2009.

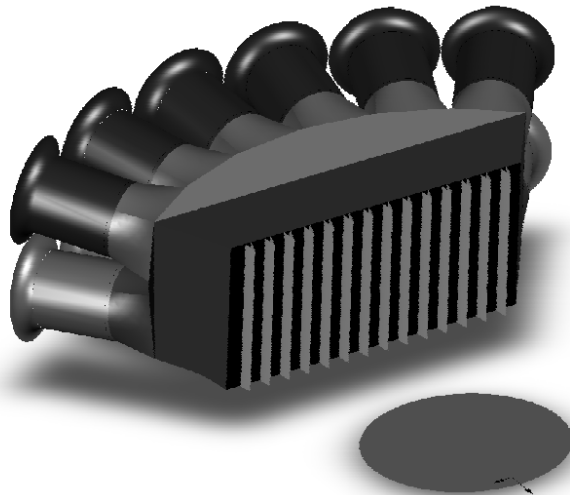


Figure 4. Schematic of 12-fan WoW system

Progress of the Florida Center of Excellence (COE) Project:

A detailed work plan has been developed for the ongoing *Hurricane Damage Mitigation & Product Development Center* (award will provide funding to develop the Center to further academic research and bring new products to commercialization). The research and industry advisory committee is planned to be finalized by May 2009 and the first meeting is anticipated in June 2009. *Alliance* will be invited to join. Through the research activities planned by this Center (using the first-of-its-kind 12-fan WoW facility) the researchers will revolutionize building practices, saving the public billions of dollars and spearheading the commercialization of scientific advances.

Briefing of the Wall the Wind Workshop Held on January 30, 2009:

WoW Workshop was held on Jan 30, 2009, involving 40 participants from academia, industry, agencies, building code compliance offices (Fig.5). This workshop facilitated the dissemination of and discussions on (i) 6-fan WoW research findings, (ii) 12-fan WoW plans, (ii) various industry needs, (iv) wind related research performed at various universities. We sincerely thank Mr. Mark Graham from NRCA to attend and present the needs of the roofing industry. The 12-fan WoW research will include the needs pointed out during this workshop.



Figure 5. Wall the Wind Workshop held on January 30, 2009 (FIU, Miami, FL)