



# Using Technology

## to Protect Against High Winds

Installing certain devices can prevent injuries and property damage

*By Jim Dunn*

**W**hen it comes to wind, man has a love-hate relationship. Wind has many benefits: It brings us changing weather and it's an abundant, clean and free source of energy. It provides comfort on a hot day, and even strengthens trees and plants by forcing their root systems to grow deeper. But wind can also be our nemesis.

This year we have seen hundreds of tornadoes, which have brought unprecedented amounts of death and destruction. In the first five months of 2011, the United States has seen nearly 500 tornado-related deaths. A single major wind event can result in billions of dollars in property damage. Thus, wind must be respected. This article will look at one way automation can be used to protect buildings, property and people from the devastating effects of high winds.

### Learn the Wind Rules

A high-wind event is defined by the National Oceanic and Atmospheric Administration's National Weather Service as "sustained wind speeds of 40 miles per hour or greater lasting for one hour or longer, or winds of 58 miles per hour or greater for any duration."

While wind speeds of this range may not rip a roof off a building, they can still do significant damage to the interior. Properly closing and sealing a building during high-wind events is sound practice. But how can we know when wind speeds are approaching dangerous levels (other than standing outside and experiencing the wind), and ensure doors are closed before catastrophe strikes?

The Door & Access Systems Manufacturers Association (DASMA), a trade association for garage door manufacturers, supplies a wealth of information, practical tips and guidelines for the construction and operation of various types of door and entrance systems. In DASMA's Technical Data Sheet No. 291, they point out that rolling doors should not be operated during high-wind events. In fact, they should be closed beforehand. It's important to be aware of the wind speeds surrounding a building

or structure, as well as know the speeds at which the building is susceptible to damage.

In most structures, doors are the largest openings and often the most susceptible to wind damage. If not closed properly during a high-wind event, their failure can contribute to greater damage to the entire structure. An extreme example is the case of airport hangar doors. If the door is left open during a high-wind event, extreme positive or negative pressures (depending upon wind direction relative to the door opening) can put tremendous stress on the roof, even to the point of ripping the roof from the building or causing a complete collapse. In the example of a three-part hangar door, an improperly or incompletely closed door can lead to sections swaying violently, possibly leading to extensive damage of the aircrafts parked inside.

The same principle can apply to greenhouses, where an open door can result in broken window panes, loss of property and injuries. Wind force can be effectively doubled once allowed inside a structure because the outside wind is putting a lifting pressure on the structure and combining with the wind inside, which is effectively trying to force the roof and walls off. It's critical to keep doors, windows, louvers and other structural openings closed in high-wind events. This is where automation can play a critical role in protecting people and property.

### Invest in an Anemometer

An effective and reliable instrument for measuring wind speed is the anemometer. The most common type is the cup anemometer, which consists of several metal cups attached to arms mounted on a vertical shaft. As wind catches in the cups, they revolve. As the shaft revolves, it generates an electrical pulse in a frequency proportional to the wind speed. This pulse is typically fed into another device, which can then convert the frequency into a wind-speed value (miles per hour, feet per second, knots, etc.).

One popular automation solution is to combine a heavy-duty anemometer with a multi-function digital panel meter



(left), which can convert the input signal from the anemometer into a wind speed and display the figure on the face of the meter. Output modules can be used to trigger various actions, depending upon wind speed. For example, an aircraft hangar, as well as the building structure, could have an anemometer mounted near the roofline. The output is connected to the digital panel meter and provides multiple alerts depending upon wind speed.

As winds climb above 20 miles per hour, a yellow caution light could be illuminated, alerting personnel winds are not yet dangerous but everyone should be on alert. As winds climb above 30 miles per hour, a red danger light can illuminate and a siren can sound, alerting personnel the hangar door should be closed. It may even be possible to use the output signal from the panel to initiate an automatic door closing.

The more advanced digital panel meters will combine the ability to generate multiple outputs, with the ability to communicate with a programmable logic controller or outside computers, for data logging of wind speeds at various intervals. The benefit of data logging is creating a database of wind-speed measurements taken at various times of the day or even continuously. This can be helpful for troubleshooting, insurance claims, and for preparing preventive action steps in future high-wind events.

With just a small investment in automation, it's possible to improve workers' safety, structural integrity and property security significantly. An anemometer combined with a multi-function digital panel meter can contribute to increased structural integrity, making the value far exceed the cost. No matter how the wind blows, you can have security and peace of mind. **PDD**

*Jim Dunn is the product manager for sensors, switches and pilot devices at Carlo Gavazzi Inc. He has been with the company for more than 12 years and in the industrial automation industry for more than 18 years. Carlo Gavazzi is a global manufacturer of automation devices including wind sensors and panel meters, providing automation solutions for more than 80 years. For more information, call 847.465.6100; visit [www.gavazzionline.com](http://www.gavazzionline.com).*



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