The Tower at PNC Plaza uses façade automation to improve building ventilation

With the appropriate hardware, controls systems, and engineering considerations, PNC Plaza demonstrates how façade automation works with great success to naturally ventilate the built space in a highly sustainable manner.

While façade automation may still seem new to some building professionals in North America, there is no doubt that this technology is gaining more attention and has been well-received and adopted by ambitious building planners and owners who wish to use natural- or mixed mode ventilation as a sustainable ventilation alternative.

LEED Platinum Certified, the Tower at PNC Plaza demonstrates how a building can achieve an optimal indoor climate, enhance employee productivity and lower energy consumption by using automated natural ventilation from WindowMaster Clearline Inc.

800,000 square feet with natural ventilation in Pittsburgh

The PNC Bank headquarters, also known as the Tower at PNC Plaza, soars with 545 feet of sustainability. The 33-storey building features a double skin façade which is what enables the building to breathe. Air vents located on the inner layer open and close automatically based on communication between the sensors, control system, and BMS that work together to ensure a comfortable indoor climate.

In addition to providing the best indoor climate possible, key drivers behind using natural ventilation included lowering the building’s carbon footprint and enhancing occupant productivity. By using a sustainable ventilation alternative, the building was able to reduce its use of other mechanical ventilation, lowering overall energy use.

“The research told us that 45% of the time we would be able to open our windows for fresh air and essentially turn off the mechanical ventilation in the building. We had to create a double skin that operated through a building control system that would open during the optimal weather days…”

Doug Gensler, Managing Director | Gensler Boston
The window actuators on the vents communicate directly to the BMS through BACnet enabled motor controllers. This particular feature makes integration easy and is a boon for BMS companies, integrators, and building planners alike because it brings the ability to include façade automation into their ventilation solution portfolio without the hassle of additional programming.

WindowMaster delivered more than 6,300 actuators to control 700 parallel windows in the outer facade skin and the 1,450 automated air vents in the inner facade.

**How natural and mixed mode ventilation come together in a building**

In the early building design phases, WindowMaster Clearline Inc. clients work closely with Building Performance Engineers to evaluate the feasibility of natural and mixed mode ventilation for the building project. This can sometimes include advice about the position or number of façade openings in the building for optimal ventilation as well as dynamic simulations, CFD analysis, and air change rate calculations. WindowMaster engineers perform some services for free during the initial planning phases which can be helpful for clients new to natural and mixed mode ventilation design.

After the analysis phase, which also includes a discussion about the function and use of the building, WindowMaster makes a recommendation on the functionality and type of control system needed. However, what sets the company apart is its ability to also offer the hardware and software components needed for these sustainable ventilation alternatives.

The hardware for these ventilation solutions includes window actuators and control systems. WindowMaster manufactures both components. The window actuators are responsible for intelligently and automatically operating the façade openings, while the controls systems connect the actuators via BACnet to BMS. This ensures that the vents work in cooperation with all the buildings’ systems. What’s more, in-house developers program the systems’ control sequences, ensuring that clients get a complete solution, from head to toe.

**About sustainable ventilation alternatives**

Across the Atlantic, sustainable ventilation alternatives are better known by their more academic names: natural ventilation and mixed mode ventilation. Both terms are widely used in academic circles dedicated to ventilation, facade technology, and building performance. As the name suggests, natural ventilation takes advantage of natural forces both inside and outside the building to ventilate and change the air in the indoor space. Mixed mode ventilation is the combination of natural ventilation and mechanical systems to exchange stale air in the building with fresh, outside air.
Key benefits of these two strategies include a fresher indoor climate and a low carbon profile for buildings. Another benefit is improved occupant productivity, up to 8% according to studies. When well-engineered and intelligent, natural and mixed mode ventilation are sought-after strategies by leading architects, building owners, and consulting engineers because they are an effective option for low carbon, sustainable buildings. They are also a benefit when trying to earn points towards prestigious green certifications such as LEED.

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