

Wind interactive facade

In this research I am going to explore the dynamicity of a building envelope achieved through a screen that can be either perforated or completely closed, depending on the conditions of the wind. The screen would work towards translating an “invisible” natural phenomenon into something not only visible but visually interesting. The building envelope can better the looks of a construction without affecting its structure and make something static and uninteresting more dynamic and up to date, so it matches the contemporary tendencies, such as responsive or interactive facades.

Building envelopes can make a building look prettier, but its functions go beyond the looks. They execute a very important role in making a building more sustainable and efficient. It can control the amount of wind, sun and warmth that enters a building and change its form throughout the day to adapt to different conditions and needs.

The building envelope is all of the elements of the outer shell that maintain a dry, heated, or cooled indoor environment and facilitate its climate control. Building envelope design is a specialized area of architectural and engineering practice that draws from all areas of building science and indoor climate control.¹

The many functions of the building envelope can be separated into three categories:²

- Support (to resist and transfer structural loads)
- Control (the flow of matter and energy of all types)
- Finish (to meet human desires on the inside and outside)

The control function (support) is at the core of good performance, and in practice focuses, in order of importance, on rain control, air control, heat control, and vapor control.²

The structural function was detached from the essence of the building envelope when loads started to be concentrated in columns. At first, the walls were responsible in totality for the loads of the building. With the Gothic Architecture, part of the loads were distributed to the buttress and allowed the envelope to have more openings, which brought more natural light into environments. As architecture evolved, the structural factor continued becoming more and more detached from the wall, allowing us to have completely glazed or even opened envelopes, as the loads are carried by columns.

With that evolution, architects had the opportunity of prioritizing the control and finish aspects of the building envelope. Nowadays we have thousands of architectural designs that are adaptive to disturbances and influences, buildings that respond to weather data such as the incidence of sunlight, strength of the wind and even human interaction.

In my design I intend to create a screen for tropical countries, warm and sunny at the most part. The screen would work towards protecting an environment from direct sunlight, but would be responsive to the wind. Wind is desired in a tropical country, as it freshens the air and cool our bodies down. Considering that, the screen would open as the wind goes through it, and when it stops, the screen closes again to keep protecting against direct sunlight.

The screen would consist of small aerodynamic parts that once closed complete a panel, but that with the wind power would rotate open in different angles, originating new patterns and different percentages of openings. Considering very windy days, the screen should have a device that limits how much it can open so the incidence of sunlight is also kept under control.

References

¹ SYED, Asif. *Advanced building technologies for sustainability*. Hoboken, N.J.: John Wiley & Sons, Inc., 2012. 115. Print. *Apud wikipedia.org*

² STRAUBE, J.F., Burnett, E.F.P. *Building Science for Building Enclosures*. Building Science Press, Westford, 2005. *Apud wikipedia.org*