

Dynamic & Responsive



“

Modern architecture is evolving from static facades to responsive facades that help minimize energy consumption

Ar. Harish Gupta

”

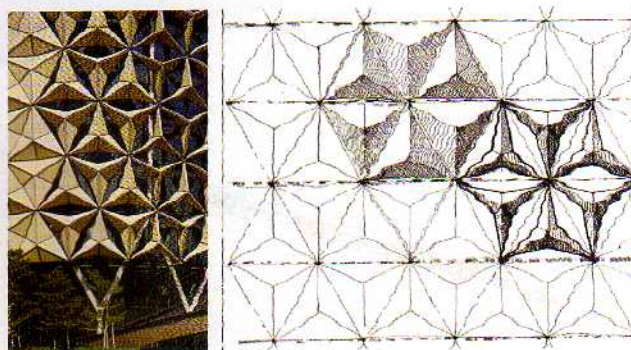
“The architecture of the future will be buildings that react, that optimize the environmental impact, and which move or change their facade and are responsive to the external environment. Such Responsive Buildings have facades that optimise the climatic impact on the building thereby controlling energy consumption and keeping it at the required optimum levels,” writes Ar. Harish Gupta, who focuses on Architecture and Retrofit Boutique facades for old buildings and dynamic facade architecture.

A building that changes its exterior face to accommodate the climatic changes outside; a building that alters its looks every few hours or days; or a building that is not static but appears to be moving and changing like a living organism. Dynamic facades are making all of this possible. Modern Architecture is moving out of conventional forms and proportions and entering a domain where virtually any form can be made interesting. A building can be transformed into a totally amazing structure through a responsive facade.

There are many buildings around the world with environment responsive facades. The Al-Bahr Towers in Abu Dhabi, designed by Aedas Architects and Arup engineers has a shading system of PTFE, a synthetic material. The system is designed to reduce the solar energy entering the building by 20%. The form evolves from the Japanese art of Origami and is one of the backbones of many dynamic facade buildings and new concepts for building envelopes. Each unit will open or close as per the severity of the sun thereby controlling the amount of light and heat entering the building.



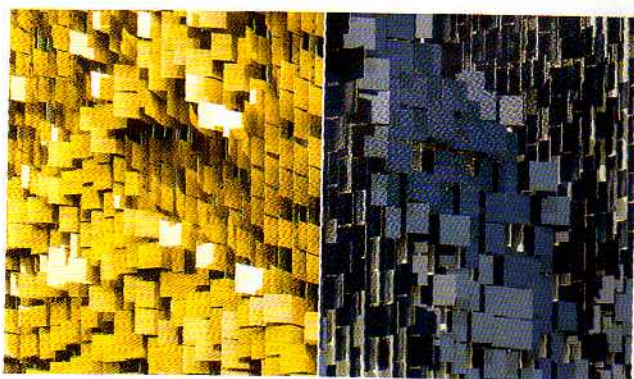
Kiefer Technic Showroom by Ernst Gieselbrecht + Partner has installed a “user-control dynamic facade” in the project located in Steiermark, Austria. The facade works through electronic controls in the building that individually control each of the 54 motors within the facade. This simple technology responds only to the user input from the building occupants and functions as a shading device controlled by the users as per their comfort levels.



Los Angeles-based architecture studio Urbana has designed the new Eeskenazi Hospital parking structure in Indianapolis as an interactive, synthetic terrain. Equipped with 7,000 angled metal panels in conjunction with an articulated east/west color system (in yellow and blue), the facade offers a unique visual experience depending on the viewer's vantage point. As one moves from one end to another, he/she will see a noticeable shift in color and transparency, while motorists driving along the street will experience a faster, gradient color change. The metal plates are oriented in such a way

as to give a sense of movement while remaining static due to their configuration and angular positioning in the entire façade.

The façade of Technorama science center in Switzerland is composed of thousands of aluminum panels that move in the air currents and reveal the complex patterns of turbulence in the wind. The façade is visible from the large urban plaza in front of the museum. There have been many variants and adaptations of this design, which can be integrated even as boutique façade elements in new or old structures. The designs call for a very precise engineering to get the free movement with the slightest of wind.



The main objective of a dynamic façade is to create movements in the building components in a way that would make the otherwise static building structure more responsive and adaptive to exterior environmental conditions. Of course, the challenges of making a dynamic façade, which maintains the delicate balance

between function and aesthetic, are many, and various technologies and materials are used. The engineering, for instance, has to be very accurate as it deals with visual effects and movements. The geometry or the proportions of the moving façade elements and static façade elements must have a smooth transition and complement the rest of the building structure. A jerky start and end will make the element alien to the complete architecture. The elements of a dynamic façade must be designed to be both eye catching and functional. If energy saving is the prime focus then one needs to compare the actual energy saved with the embedded energy as well as the energy it will save over the years.

The concept is very new in India and currently a very few projects are exploring such façades. However, there is a huge potential for dynamic façades in India as the country is in the tropical zone and buildings here have to bear a lot of air-conditioning costs. The Indian mindset has also changed over the last two decades, and people are more open to accepting or experimenting with new concepts and solutions. Both developers and architects are keen to create a unique identity in their projects by incorporating the latest international trends and exclusive designs in their projects. Various materials can be used for the construction of dynamic façade and there is virtually no limitation to what you can do as it's all about forms and movement. Materials range from metal sheets of any metal, fabrics that can withstand the weather, glass, wood, fiber glass, steel, GRC, SS mesh, composites, mechanical devices, plastics, silicon, etc; the list does not stop as the ideas don't stop. ♦



This dynamic façade in Mumbai is designed with thousands of metal sheets suspended with pin joints. The air movement over the surface is mimicked by the metal panels creating patterns and multiple reflections as per the intensity of the wind on it. The concept is very similar to the Technorama science center, the only difference is its much smaller scale and the effect is limited to a smaller area than desirable.