



LIVING EXTERIORS

EFFICIENT AND VERSATILE, BUILDING SKINS HAVE BEEN EVOLVING AS INTERACTIVE AND SUSTAINABLE SURFACES

BY CAROL FERRAO

More than an envelope, modern-day façades and fenestration are almost breathing, 'living' systems that make buildings more efficient and interactive. They have evolved from being a cosmetic addition to exteriors to being proactive in maintaining healthy, quality interior environments. While interesting forms still fascinate the design community, it is the functional significance of these shapes that are truly worth exploring. Materials – from wood, stone,

porcelain, glass, metal to even polycarbonate – are becoming more adaptable to intelligent façade designs, giving architects the opportunity to design the most stunning building skin.

But it is sustainability that is driving product development and application in this sector. "In the residential segment, the focus has shifted from luxury and high-end housing to affordable housing, which means cladding products on main façade will be minimum to keep the pricing low. Common areas and club houses are where cladding plays an important role in

1. Fundermax Max Compact Exterior (F Quality), a rainscreen cladding product as seen on Sattva Galleria, Bengaluru.



2. Dr. Prashanth Reddy, MD India, FunderMax.

3. Designed to withstand the elements, this Fundermax rainscreen façade features a double hardened acrylic polyurethane resin which creates a powerful weather-protective coating.

terms of durability, sustainability and minimum maintenance. In case of non-residential segments, there is increased need of having sustainable and energy-efficient buildings due to energy crisis in most of the Tier 1 cities," states Dr. Prashanth Reddy MD India, FunderMax. In the near future, infrastructure projects such as airports and metro rail will also drive the demand substantially.

Since change is the only constant, solution providers and innovators are being receptive to current needs and expectations. "The last few years have seen a very dynamic shift in the façade industry due to the various climatic changes, awareness and education about Green buildings, and more façade system companies have entered the Indian market. We are seeing many clients wanting to invest in the thermal break façade and window system, and use of high-performance glass in residential projects has increased," says Ebrahim Chiniwala, owner, Chiniwalas.

There is also the Indian context that needs to be taken into account. As architects, the team at Edifice Consultants recommend perforated screens, automatic fins, horizontal louvers and ceramic fritted glass – all help in controlling solar glare, while permitting ample interaction across the interface – as apt solutions for the country. "Spaces within campuses can be earmarked with bold colours and contextually relevant patterns; a strong consciousness of the environment has led to experimental designs to dabble in the use of shipping containers, paper rolls, glass bottles, ceramic and earthenware, and other recyclable materials on larger façades as well," they further note.

Earthy tones are also receiving much-needed appreciation when it comes to façades, and materials like clay tiles and engineered wood are ideal for the country. "While you might find clay tiles on the façade of India International Centre, Delhi, it is not an old intervention. The inclusion of information-based systems and compressed earth tiles have made the product durable. The tiles certainly add to the grain of the façade and regulate the amount of heat received inside. Similarly, engineered wood moves beyond the shortcomings of timber, to present a durable material that adds a rich and serene aesthetic value, and a sense of age," shares Amit Khanna, principal, Amit Khanna Design Associates (AKDA).

ENVELOPED IN SUSTAINABILITY

While it may be considered just a buzzword, sustainability has been a key determinant for a building's façade system in

recent times. "To influence this trend, FunderMax provides rain screen façade system that improves building protection by enhancing functionality of façade with respect to heat and noise reduction, and better weather protection," says Reddy. Improving the thermal efficiency of the building, through an effective façade design and highly functional fenestration system, is the primary goal. A well-designed façade reduces the thermal bridges, condensation of water vapour, protects the building and increases sustainability, Reddy explains.

With glass still being a preferred – and in many instances, ideal – solution for most building skins, the adoption of energy-efficient glass becomes pertinent. With each passing year, solution providers like Saint Gobain are innovating their product line keeping sustainability in mind. "Saint Gobain offers high spectral selectivity (light-heat ratio) glass such as SGG Envision, a cutting-edge, double-silvered glass that allows abundant light transmission with advanced Solar Control and excellent thermal insulation (Low E) properties. Its functional layer of silver imparts the property of low emissivity, a basic need for excellent thermal insulation," shares a Saint Gobain spokesperson. What makes SGG Envision even more interesting is that it is available in jumbo sizes that give façades larger, sleek, clear panes on the exterior.

Schüco currently has solutions that meet the very demanding Passivhaus standards. Passive house (German: Passivhaus) is a rigorous, voluntary standard for energy efficiency in a building, which reduces the building's ecological footprint. It results in ultra low-energy buildings that require little energy for space heating or cooling. "Though there are clients in India who demand the best possible sustainable solutions, the majority of the market is not in a position to pay for the increased costs. Also, because of the more temperate climates in India as well as lower energy costs compared to Western countries, clients don't see a return on investment for these super insulated products," explains Rajeev Antony, MD, Schüco India. The new solutions will focus on bringing down the cost of these super insulated products. "We are also focusing on creating more medium-insulation products for regions like the Americas, Middle East, India, China and South-East Asia," adds Antony.

Green solutions are going above and beyond protecting the interiors from the elements, now it's also about optimising the solution to provide more. "The use of Building Photovoltaics (BIPVs) on the roof and the Southern and Western façade – which are most prone to solar glare – is on the rise,"





4. Designed by AKDA, the glass panels on Tessellate may appear randomly sprinkled, but their positions are the result of interior daylighting requirements.

5. Ebrahim Chiniwala picks The Louvre, Abu Dhabi, as an exemplary façade designs. The intricate dome façade filters light into the interiors, creating an ambience like no other.

6. Amit Khanna, principal, AKDA.

mention Team Edifice. They explain that BIPVs are essentially a combination of semi-transparent photovoltaic cells called amorphous PVS and opaque photovoltaic cells called crystalline PVS, that are used extensively to generate electricity in-situ. It also addresses air quality—by facilitating a cleaner, healthier environment.

CONTEXTUAL CHALLENGES

There is no dearth of specific solutions, clearly. But nevertheless there are some challenges that are peculiar to our country. Cost is always a factor in the Indian market and, apart from that, material durability is a factor, points out Khanna. “We are always in need of materials that look good in all weathers, do not break, do not stain, do not bloat, do not warp – because shock is a challenge, dust, rain and extreme sun are a challenge. Apart from durability, cultural orientation is another challenge. Some people want more visibility to the outside world, others do not. Affinity towards materials is also a personal factor that plays an important role in the definition of façades.”

An architect or a façade designer faces conflicting priorities and interest between the different parameters of energy efficient and sustainable façades for buildings. For this, Reddy recommends a proper cost-benefit analysis – as well as payback analysis – on the right material and installation system when designing energy efficient façades that are also aesthetically superior. “High-pressure laminates at the rear ventilated façade

CASE STUDY: TESSELLATE

Tessellate is nestled in Greater Noida, in the midst of an industrial hub allocated to the garment manufacturing business. Given that fabrics are about patterns and often repetitive, AKDA designed the façade as layers (another garment reference) to create a multiplicity of surface textures. Cool grey glass is combined with a gradation of blue, grey and white aluminium panels that seem to emerge with solidity from the ground, and eventually dissipate into the horizon. The exposed ends of the framework peek out from behind the top of the finished cladding, like the tassels of a carpet - proud of their necessity in the process. The name of the building is derived from the visual complexity of the façade. To tessellate is to repeat a pattern so as to create a plane. The unit chosen here is the triangle, the proportions so chosen for the ability to extract exactly four equal four-foot side pieces from a single 8ft x 4ft sheet. Apart from the longevity, the idea that material must not be wasted is a key component approach to sustainability. While the glass panels may appear randomly sprinkled, their positions are the result of interior daylighting requirements. The colours of the panels themselves have been chosen for better light absorption at lower levels, with higher levels of reflectivity closer to the top of the building. A tubular aluminium frame supported on robust metal brackets underpins the façade. Diagonal cross bracing support the glass and aluminium panels on the peripheries, creating the precise six sided joints.

offer an opportunity to architects and their clients to design and build iconic and contemporary buildings that showcase the creativity of architects and designers,” suggests Reddy.

“Economic conditions, willingness to explore, and access to cutting-edge research/knowledge – all of these challenge the exploration of avant-garde façades and fenestration in India. Thus, one resorts to importing the best products. The escalation of costs which follows is another impediment,” points out Team Edifice. And when details are not well-integrated into the products, it results in poor application, installation and user experience. “While there is no dearth of top-of-the-line components and materials that can be used to design intelligent and efficient façades, clients are often unaware of these innovations. Given these factors, bringing in complexity in façade design – whether for aesthetic purposes, or utilitarian – becomes fairly challenging,” they add.

Often people overlook the many benefits of a well-designed solution and are hesitant about the price. “The aluminium façade and fenestration industry is in the intermediate stage of growth in India...it is still growing. Challenges such as perceived notion (amongst end-users, developers) about price as compared to performance, standardisation in fabrication quality and set-up (for fabricators) are some of the challenges that the business faces,” says Antony.

For architects, mitigating some of the challenges means looking closer home for solutions. “We do not see inclusion of vernacular details, and take-offs from vernacular techniques. Like compressed earth tiles and engineered wood are the composite materials replacing the natural ones; we also see that, here, the cultural as well as construction knowledge related to these materials has, time and again, been brought forth,” points out Khanna. There is a range of alternate materials and fringe construction practices that need to be made mainstream, which will bring diversity in façade design.

It’s equally important to realise that not all façade and fenestration solutions can be sufficed by importing. “The Indian marketplace demands innovations of its own. We are looking



7. Ascendas Victor by Edifice Consultants has staggered panels of coloured and clear performance glass that are stacked between concrete bands, indicating levels within the tower, reducing heat load and optimising resources.

8. Architect Amit Khanna picks Shanghai Theatre by Foster+Partners and Heatherwick Studio as an exemplary façade design. The moving, curtain-like façade adapts to the building's function, revealing and concealing the interiors accordingly.

for materials which address the peculiar issues of the Indian climatic conditions like dust, moisture and rain and which will improve the longevity of products – and hence, buildings – while reducing maintenance costs,” say Team Edifice, adding that contextually applicable façade solutions need to find a wider applicability in India. They suggest easily operable low-cost sunshades and rain protection projections that can help designers avoid RCC *chajja* (canopy) projections on every opening and also lend dynamism to the façades.

VIEW FROM THE FUTURE

While designers and solution providers continue to navigate the unique challenges they face in the local context, the world of innovation will continue to charge forward. “The future of the façade industry is moving mostly towards sustainable façades. Going ahead in the future, we are seeing the trend shift towards more contemporary straight-line façades. And many architects have finally moved away from ACP (Aluminium Composite Panels) and are using other interesting materials like porcelain tiles, high-density laminate and many other

CASE STUDY: ASCENDAS VICTOR

For Ascendas Victor, a multi-tenanted building that is part of the 9-acre corporate infrastructure development, Edifice Consultants relied on an intelligent façade design to create sustainable built environments. The cuboidal form of the 14-storey building is aligned along the East-West axis, to maximise north lighting and reduce heat gain. To reduce heat load and optimise resource consumption, staggered panels of coloured and clear performance glass are stacked between concrete bands indicating levels within the tower. The panels are 1050mm wide each, factored from the typical width of raw glass sheets available to ensure minimal wastage. The façade - with 17.5mm-thick heat-strengthened DGU glass and 24mm-thick frit glass panels arranged modularly - achieves 35-37% glazing, the optimal wall-window ratio. Paired with performance glass, this proportion of glazing ensures optimal diffused daylighting inside the building with minimal heat gain. With daylight penetration of up to 12-15m, the floorplates are uniformly lit from all sides, allowing for flexibility of function within. Being a multi-tenant building, leasability was a crucial factor - given that the offices would be Built-To-Suit (BTS), it was important that the ingress of daylight be largely consistent across each floor and each office within. The design of the façade takes this into account, and ensures a consistent wall-to-window ratio on each floor and across the grid. The use of blue-green laminated glass and orange frit glass further reduces the glare inside the office space, creating an ambient glow.

new materials for cladding,” shares Chiniwala.

From being inanimate to being truly “alive”, façade solutions will continue to transform the way exterior surfaces interact with the surroundings. “At one point, we might see prefabricated façades and, at another, we might see façades integrated with software to enhance their resilience to customer choices, moods and energy requirements; as well as capacity of interior spaces. So, façade designs that are operable are going to be in use increasingly,” predicts Khanna.



9. Rajeev Antony, MD, Schüco India.

10. Saint-Gobain picks Monte Carlo, designed by Edifice, as an impressive façade. Full-height glass panels maximise the ingress of diffused lighting on the north, whereas the South-facing side has a three-dimensional façade made from electromagnetic glass panels. Inspired from the cut of diamonds, these panels form multi-faceted units that are arranged in a staggered grid to form a distinctive, shimmering façade.

11. Schüco India's new thermally-insulated panoramic design series of sliding doors, called ASE 67 PD, enables an almost frameless design.

12. A before-and-after comparison that highlights the advantages and sleekness of Saint-Gobain's Jumbo series.



Interactive is definitely the key factor to watch out for. "Glasses that can be media vehicles, is the next generation of façades. In a scenario where energy efficiency and sustainability are considered to be the basic product offerings, this is anticipated to be the next area of interest. The modern cities across the globe have already begun on the journey of using façades as communication channels," shares Saint-Gobain. This is being partly realised with Saint-Gobain's PICTUREit, a glass publishing canvas wherein any image or vector file can be processed and printed for use in both indoor and outdoor applications.

For the longest time, façade design has been obsessed with maximising glass areas – but new variations could be on the horizon. "It is possible that the focus on non-transparent façades as well as façades that change their transparency electronically come into vogue. With higher focus on sustainability, there should be increased focus on solar shading. We also expect new-age materials – fabric façades, for example, becoming more prominent. Windows, doors and sliders made from materials like glass-fibre reinforced plastics, as well as carbon fibre to achieve larger sizes and weights, is another interesting area. These are all areas that Schüco is already exploring," mentions Antony.

According to the team of architects at Edifice, the two developments that we can look forward to are 3D-printed façades and self-growing façades. With a great impact on the speed and ease of construction, and providing a scope for extreme scalability, 3D printing appears to be the next big paradigm in



BEFORE



AFTER

NEW PRODUCTS

Saint-Gobain has invested in a manufacturing facility that makes high-performance glasses of size 3,210 x 6,000mm - which will allow faster construction and elegant façades that are cost-effective when compared to conventional solutions. With this size, architects can build façades that could look elegant in larger panels. The occupants of the buildings will find minimal interference from the framing elements, and enjoy an overall better view of the exteriors.

Schüco India is launching a thermally-insulated panoramic design series of sliding doors called ASE 67 PD. Not only will the series enable larger sizes, sleeker profiles and premium looks, it will give an almost frameless design - a feature often desired by architects and discerning buyers. The new series will also perfectly complement their non-insulated panoramic series ASS 39 PD NI.

Chiniwalas is in the process of developing and introducing an Australian-designed thermal break windows system that will be approved as per all AU standards. These windows improve energy efficiency by controlling the forms of heat transfer, which is achieved by separating the outside metal parts of the window from the inside with a material, reducing the amount of heat or cold transferred through the frames.

façades and fenestration. Self-growing façades with algal or vegetative deposits assume the form of the underlying 'skeleton', and envelope the building over time. "Cost-effective and unique, with a tremendous impact on aesthetics and quality of air, this is bound to usher in some very distinctive projects in the near future," the architects note. This is just the kind of promising, creative future to look forward to. **R&I**