ADAPTIVE, RESPONSIVE AND HIGH-PERFORMING

NOT ONLY DO WINDOW AND FENESTRATION SYSTEMS DEFINE THE AESTHETIC LOOK OF A BUILT STRUCTURE; BUT NOW, THEY ALSO CONTRIBUTE TO ITS ENERGY EFFICIENCY AND THE WELLNESS OF ITS INHABITANTS

In today's realm of residential skyscrapers and mixed-use buildings, the strongest impact is arguably made by the building's elevations and the fenestration systems that dick up these elevations. It inevitably sets the tone for the building as a whole. Buildings have evolved from being predominantly passive systems to having high levels of internal control, thus, causing fenestration design to be a major component in achieving energy efficiency.

Window systems today are engineered with a definitive purpose, to function not only as a visually appealing design expression but also enhance the energy efficiency, and overall quality of the interior environment and also provide acoustic qualities. With an explosion of new materials to explore and incredible technological advancements, fenestration design and window systems are at their most innovative, and functionally proficient, stage today.

Windows systems play multiple roles including supplying daylight, providing views, acting as ventilators, noise and heat insulators and glare protectors. They not only add to aesthetics but are also a significant component of heating and cooling costs. Building owners opt for the most efficient façade and fenestration system which contribute to the energy efficiency of the building and thereby its operational costs.

Trending terms like 'smart' and 'high-performance windows' are revolutionising the fenestration industry. Development in technology and architecture has given way to new-age building products which are more adaptive, responsive to the environment and the occupants.

HIGH-PERFORMANCE WINDOWS

Under the high-performing category, we have the products such as the 'Thermal Break Windows', which is a major innovation that addresses extreme climatic conditions with its multi-chamber profiles, that provide better insulation of heat and sound as compared to cold profiles.

"Thermal Break windows are tightly shut to cut down outside heat and maintain room temperatures. The heat resistance windows by Geeta Aluminium keep the house precisely insulated in summers and also consist of a three-barrier system, which helps in air infiltration. The multi-point locking system is available for better sealing between the profiles and the usage of bigger panels helps in achieving higher thermal efficiency. Installation of thermal break windows also assists in LEED certification of Green Buildings," explains Atin Thacker, marketing director, Geeta Aluminium.

Geeta Aluminium's latest innovation is SLIMO range exclusively designed for bungalows and luxury apartments. In this, the locking unlike the conventional windows is hidden in the frame itself. All you see is one clear stash. These windows are equipped with concealed lock system and large openings providing an uninterrupted view of the world outside. It not only provides a one-touch smooth operation but also adds an elegant look to the aesthetics of your surroundings. Alongside aesthetics, slim series have properties that shut out disturbances like noise, dust, water thereby ensuring good functionality and making your house feel comfortable.

A great deal of customer satisfaction is observed in the use of uPVC which made it the most recurrent and concurrent material for windows today. High-performance uPVC windows are very fine insulators of heat ensuring reduced cooling load in the interiors. This in turn lowers the CFC emissions creating better indoor air quality. Double or triple glazing decreases the sound transmission and the U-value of the unit significantly. Having an expected lifespan of 35 years, uPVC systems can be custom-made with the desired amount of toughness for high-rise structures.

KEY FACTORS

With the ever-increasing number of towering glass and metal-clad monoliths, even the most iconic buildings must face the challenge of interior climatic control. It is therefore imperative to study and understand the efficient usage of fenestration design by designers, vendors, manufacturers, developers, and clients, in order to actuate the buildings' energy efficiency and thus operational costs. The performance of elements like windows along with other building

2. A section through Atin's Sky series window panel.

3. Atin Mehta, executive director, Atin.

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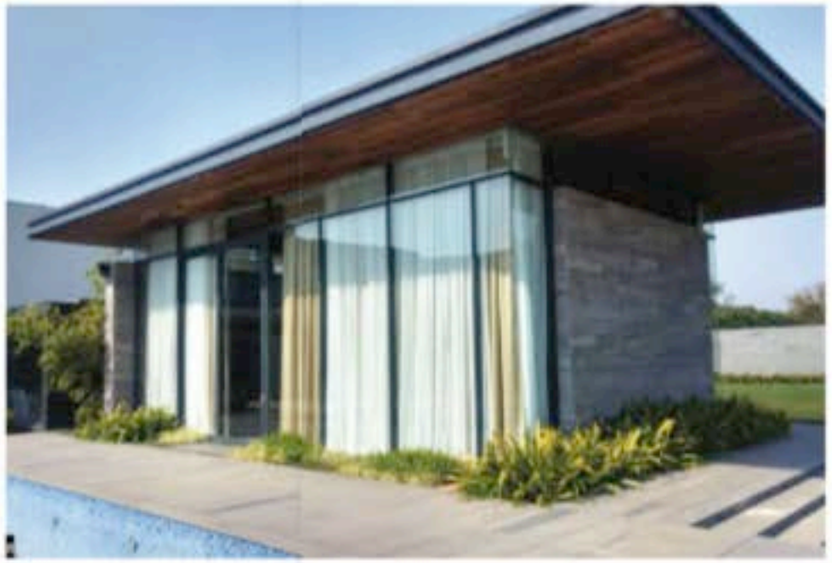


MAJOR INNOVATIONS IN THE FENESTRATION INDUSTRY:

A significant trend in architecture today focuses on fenestration systems that are minimal in design and facades that feature an all-glass aesthetic. The advancements in technology to engineer, manufacture and finish these products have kept pace with the demands of the consumers. Some of these include:

- Technologies such as wood fiber-polymer composites for clean, minimal lines that mimic the natural beauty of wood
- High-density fibreglass exteriors and aluminium interiors that ensure a modern aesthetic and the ability to achieve high performance in extreme climate geographies
- Easy to use and operate large, heavier window panels and doors that provide uninterrupted horizontal glass spans that produce clean visuals and blur the line between the indoors and the outdoors
- The introduction of thermal break window systems, anti-theft and security systems
- Automated window and doors that allow users to operate large window systems at the touch of a button on a smartphone or tablet.
- Double thermal systems with insulating glass that deliver exceptional thermal performance'
- Solar power generating windows called Transparent, that alters their light control state and appearance in response to external stimulus like heat, sunlight or voltage. Another mind blowing innovation is the Transparent display technology that turns an entire screen or window into a motion display panel without affecting the view through the glass.

4, 7, 8 & 9. Projects crafted with Alco's elegant fenestration solutions.

5. Alberto Gorlini, partner & project manager, Gorlini

6. Ato Thacker, marketing director, Gorde Aluminium

components determines the energy cost as well as the size of the heating and cooling equipment. Thus, although initial costs for energy-efficient windows, is on a higher scale, savings are made with a reduction in the purchase price of heating and cooling systems for the building and thereby counterbalance the initial capital cost. The design of an efficient fenestration begins by defining Key Performance Indicators (KPI) for the building depending on its location in one of five climatic zones within India.

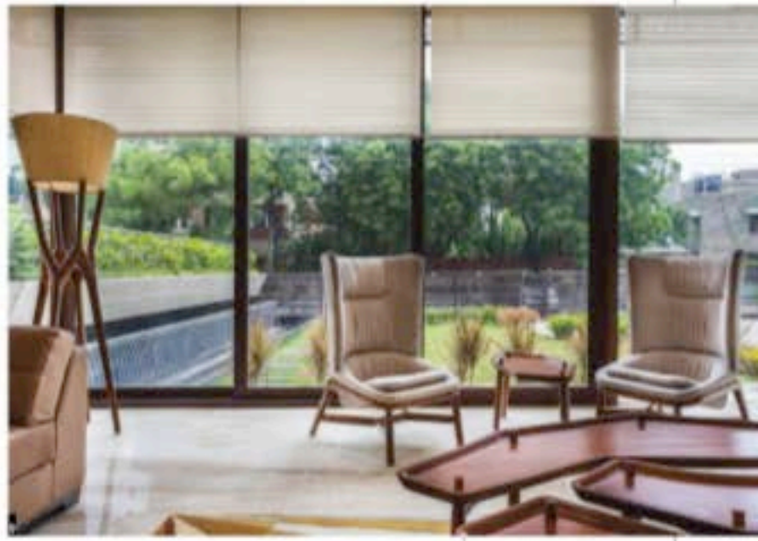
Proper orientation allows for passive solar gain and daylighting, and reduced heat gain/loss, whereas the appropriate window-to-wall ratio will allow for a proper balance between the daylight and the heat gain/loss thereby optimising the energy consumption for both lighting and HVAC.

Choosing of right materials for windows coupled with the type of system used for the installation of such materials makes a large difference to make buildings energy-efficient and sustainable. Technological innovations today have enabled architects and designers to express their inclinations and ideologies in distinctive and individual manners, far more easily than ever before. This leads to the importance of understanding the various types of window systems available and being able to choose the most appropriate and cost-effective solution for the relevant buildings.

The core functional idea is to work with nature rather than to try and resist its influences. ""Across all verticals, certain demands are common to all fenestration systems. While designing large openings is easy, it is the performance of systems that matters the most. Typical glass walls must perform despite the change in seasons - while this is the most important attribute, it is also the weakest link if not designed properly. Other attributes include energy efficiency, systems that seal out the wind and rain, and systems that offer extreme weather resistance," says Nitin Mehta, Executive Director, ALCOI

He adds that: "In non-residential verticals, we have found that product selection is becoming increasingly complex, due to three demands from building occupants: greater security concerns, the need for fenestration that is easier to use and operate, and doors and windows that enhance client or user satisfaction. This has led to growth in newer products—automatic doors, tilt-and-turn windows, and a new generation of robust storefront systems."

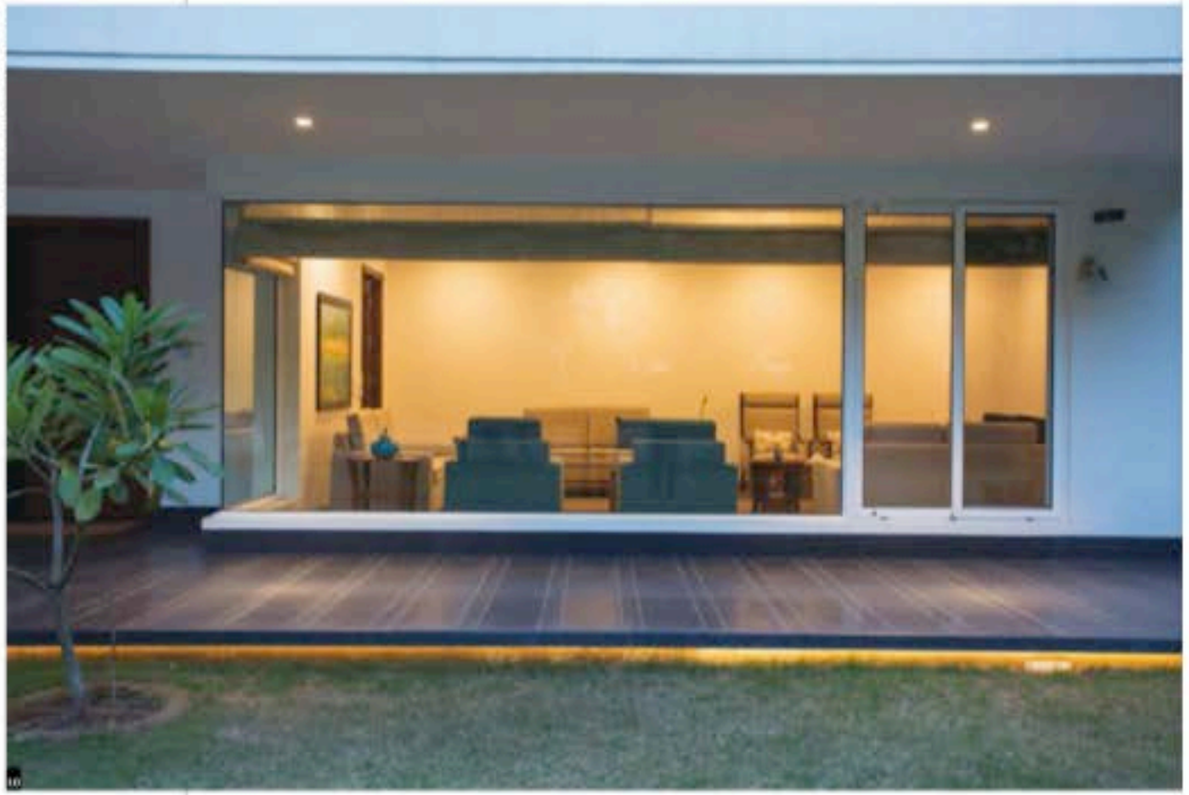
Continuing on the same thread, architect Alberto Gorlini, partner & project manager, Gorlini, mentions that "Depending on the destinations of use, the windows have different characteristics. These characteristics usually concern the material, the type of profile, and the acoustic/thermal performance. Wood is more used in the residential while aluminium in the office and hotel sector. However, aluminium windows with some very thin and aesthetically beautiful profiles also fit well in residential. The choice of the design of a window depends on the style of the project and the interior that the architect has thought of. Nowadays the windows have different aesthetic lines that well adapt to the different styles of the houses, from modern to classic. It is the architect who decides which window system to choose which in turn will be dictated by the project's aesthetics."



INNOVATIONS

Façade industry, today, is undergoing many changes in terms of functionality and performance. Adherence to strictest energy and quality parameters and norms has given rise to more robust, energy-efficient, innovative and adaptable window systems. "The major innovation in the world of windows today is that of being able to create very large windows with very thin profiles and the possibility of handling them with vanguard motorized systems," adds architect Alberto.

The glass industry, with its craftsmanship and modern production processes, is also in a state of constant innovations. "Particularly impressive are solar power generating windows called Transparent that alters their light control state and appearance in response to external stimulus like heat, sunlight or voltage. Another mind blowing innovation



11. Sonali Asher, founder, Hacienda Interior Architects.

12. Ayaz Danish, national manager, Residential Business, Schueco India.

is the Transparent display technology that turns an entire screen or window into a motion display panel without affecting the view through the glass. Great for storefront glass windows & other high contrast projection display," reveals Sonali Asher, founder, Hacienda Interior Architects.

Home is our shelter and sanctuary which must be safeguarded from outside elements like weather, theft and burglary. Schueco window and sliding systems come with various burglary resistance class (RC) ranging from RC1 to RC6, meeting the highest safety and security standards.

"Schueco, very shortly will also be offering anti-microbial handles and profiles with high-purity micro silver particles that are incorporated into the surface finish- germs that come into contact with the surface die off and efficiently prevent from reproducing. This is important in today's extreme hygiene conscious environment, thus aiding in safety from germs," reveals Ayaz Danish, national manager, Residential Business, Schueco India.

CHOOSING THE RIGHT PRODUCT FOR THE RIGHT SPACE

Windows are the gateways to the outside world in between the hectic and monotonous home and work schedules. Controlling glare and increasing visual comfort is a contributing factor to satisfied workers and increased productivity. Solar screen window treatments cut glare on computer and media screens, increasing productivity and the quality of image, design and clerical work, without cutting off the view through the window. In the healthcare sector, evidence-based design research has shown that

day lighting not only reduces energy costs but enhances the building environment, providing health benefits to patients and creating a pleasant and comfortable environment. Solar screen shades, privacy shades and translucent roller shades are an important day lighting component in hospitals.

Atin Thacker from Geeta Aluminium, spells out the various factors that are considered across various segments, for selecting the right product: "In residential, safety, security and usability are the three most critical factors. Use of multipoint locking in windows provides additional security and improved occupant sense of safety. Ease of operation for regular usage of windows is also an important criterion for residential windows.

While on the other hand, sound insulation plays a very important role in offices and hotels. Noise-free interiors are a priority for offices since they are usually located on busy streets bustling with activities. Loud noises seep into the office space through doors and windows causing disturbances. Hence sound proof windows are ideal.

Noise in hospitals and medical facilities has a significant impact on patient health and on staff wellbeing. Sound Insulation in window can help achieve a comfortable acoustic environment. It plays an important role in supporting safety, health, healing, and well-being for all occupants.

Another aspect here is also the thermal insulation. The purpose of thermal insulation in buildings is to maintain a comfortable and hygienic indoor climate at low ambient temperatures. A closed, well-insulated window will help to keep the building cool when the outside air temperature is higher than the inside temperature

In hospitals with ducted air conditioning system, fixed windows are ideal. Fixed windows are safe for the patients and protects from dust, noise and pollution maintaining peaceful and healthy environment. Large picture windows result in increased daylight and make the surroundings look like a pleasant and cheerful place. Operable windows should have provisions to restrict the degree of opening to be used in incase of emergency rescue and usage.

Continuing on the same lines, Asher adds that "Be it home décor or commercial space décor, glass solutions have taken over the traditional options. Glass has been transformed from the most fragile to the most versatile and durable solution and that is a boon for interior designers and the building industry in general residences, hotels, offices and hospitals all have distinctive demands. Depending on that, selection of glass is of paramount importance as it plays an important part in the aesthetics. A residence would want to capture a picturesque view with floor to ceiling glass windows, while a hotel lobby would desire a skylit atrium. An office would require the soundproof option while hospitals would stress on privacy needs. The window manufacturers offer a variety of options for our varied privacy and aesthetic specifications."

The market is highly equipped and continuously emerging. Designers can today choose from a diverse range of fenestration systems. As sustainable design is gaining traction, high performance windows are playing their part in contributing to saving energy and costs and at the same time, creating flexible comfortable ambiences. ■

10, 12 & 14. Projects crafted with Alok's elegant fenestration solutions.

MORE THAN JUST 'CONDITIONING'

A LOOK AT THE MANY INNOVATIONS AND SOLUTIONS, STEERING THE HVAC INDUSTRY THAT IMPACT A BUILDING AND ITS INHABITANTS

The HVAC industry has been in constant flux. Catering to the ever-evolving demands of the markets, its solutions and offerings went from merely providing cool and conditioned air to defining the green quotient of a building, to maintaining the perfect IAQ, and now, its functionality also includes disinfecting and safeguarding the enclosed space. As Ravideep Singh, principal architect, CDA Architects, rightly puts it: "HVAC systems are like neural systems to the body of the building; self-efficient and autonomous HVAC systems would ensure that the facilities are greener, healthier and sustainable if designed well."

With these changing scenarios, in 2021, there are many innovations and solutions, steering the HVAC industry that can impact a building and its inhabitants.

PUSHING ENERGY EFFICIENCY TO THE FOREFRONT

Increasingly, there is a focus on efficiency in the HVAC industry and market. Everything from high-efficiency equipment and products to limiting heat loss, architects and consultants are looking for new tools and technology innovations, and solutions to reduce waste. "The urban landscape continued to evolve as a result of modern construction technology. With the availability of inexpensive fossil fuels, sealed glass-and-steel, building spaces could be heated and cooled with massive (HVAC) systems. With depletive resources and harmful emissions to the environment, the need for sustainability drives our thought process to build holistic environments leading to the movement's demand," avers architect Ravideep Singh.

Sharing the same thought, Tripat Girdhar, principal archi-

1. Ravideep Singh, principal architect, CDA Architects.

2. [illegible], director & business unit head, Living Environment Division, Mitsubishi Electric India.

3. Tripat Girdhar, principal architect, The Design Studio.

4. [illegible], MD, [illegible]

tect, The Design Studio, says that, "There's been a growing awareness about global warming capturing the public attention at large; and the HVAC industry has been propelled for about a decade now, by the Green Building movement to look at creative ways to minimise energy costs and enhance the efficiency of the indoor climate. The current focus of HVAC technology has moved towards sustainability, comfort, and energy efficiency. This is extremely significant based on the current scenario, our environment and the increasing demand for energy-efficient heating and cooling systems. To achieve an effective and higher level of green building ranking, the HVAC system should not only meet the norm on energy front, but also beat the standard codes such as Energy Conservation Building Codes (ECBC), India."

Further shedding light on this point, Naohiko Hosokawa, director & business unit head - Living Environment Division, Mitsubishi Electric India, states that "The concept of green buildings is evolving and growing as we speak. The built environment space is to benefit from the growth of green buildings. There are three key benefits – clean and hygienic environment, economic value, and a positive social impact. World over, green buildings bring multiple benefits. This includes addressing climate change, creating sustainable and thriving communities, and driving economic growth. This means energy-efficient buildings use technology and applications that consume less energy and give maximum output."

In this light, Mitsubishi Electric's commercial and residential air-conditioning systems have earned a global reputation for higher performance standards, uncompromising reliability, and very high energy efficiency. Hence, there still lies a big opportunity for HVAC business in the Indian Green building space. The industry is widely on the outlook for technologies that can factor in aspects like being environmentally friendly, high in efficiency (coefficient of performance - COP), low energy consumption and highly reliable (less downtime). "One such unique feature is when a single/multiple outdoor units can be used to run multiple indoor units – makes it space more efficient. Outdoor units can therefore be installed in small spaces too. This offers a quiet and comfortable environment," explains Hosokawa.

There are several other options available if one wishes to select energy-efficient products – split type, light commercial, city multi-VRF and ventilation systems to suit any requirement. Based on various factors including the type of application, usage, area to be air-conditioned etc., it is suggested to look for options like the split type for households, one can look at cassettes ceiling concealed for smaller commercial spaces; and VRF & Ventilation systems for larger establishments such as hotels, hospitals, factories, premium residences, offices and other industrial or large spaces.

MAINTAINING THE IAQ

Right before the pandemic hit us, indoor air quality had become an extremely critical topic in the HVAC industry. With air pollution hitting dangerous levels in cities across India, IAQ standards were set across all boards to counter this. And the HVAC industry played a crucial role in help aid this movement. "As building design and its environment become more complex, space's thermal comfort and characteristics also become complex systems of varied control methods. As technology advances, more and more products that allow users to integrate these systems into a comprehensive and user-friendly manner are being created. Even the control methods shift from complex switchboards to electronic touch screen tablets or phones and even voice commands. Offering a range of control options, graphical representation, and mobility automation carve the way forward for HVAC systems," explains Alok Hada, director, Anusha Technovision. As he rightly mentioned, HVAC systems, today, are intuitively connected to softwares and dashboards, to not only monitor its operations but to also take note of the CO2 and oxygen levels, pollutants, particulate matter, etc. And now while we stride along with the pandemic, viral and bacterial infiltrations are also being added to the list.

In the wake of his movement, Mitsubishi Electric introduced a new concept about maintaining indoor air quality called 'It's Time to Upgrade Your Air' under the Air Conditioners digital awareness campaign – Creating your Comfort. In the Post-COVID scenario, the "new normal" has evolved, where working from home is getting normalized and the minimum acceptable standard of air-quality has changed. The company has redefined comfort with fast, clean, and eco-friendly air conditioners by combining it with a Lossnay ventilation system for better indoor air quality.

Amidst the ongoing COVID-19 era, staying at home with little or no contact with nature may become unhealthy when there's no proper ventilation system to supply clean air. Mitsubishi Electric's Lossnay Ventilator is a complete heat exchange ventilation system that uses paper characteristics to perform temperature and humidity exchange. It helps to maintain appropriate humidity and temperature for people to stay comfortable.

The system only draws fresh air from the outside – it does not take air from the attic, the build-up of dust, dirt, and other contaminants such as mold, insect, and rodent droppings make air in the attic area much harder to filter before it is distributed to your home. Therefore, Lossnay System specifically utilises direct fresh air after proper filtration.

This cutting-edge technology will help the consumers to get fresh air to stay healthy at home. Backed up by an energy-efficient air conditioning system, Mitsubishi Electric Air Conditioners will provide consumers a chance to enjoy new normal in the safety of their houses.

5. Mitsubishi Electric's Lossnay Ventilator is a complete heat exchange ventilation system that uses paper characteristics to perform temperature and humidity exchange.

6. Cool Automation's devices enable HVAC systems to be controlled, serviced, optimized, and managed remotely. Making it easier to create the perfect climate control in smart interconnected buildings.

CASE STUDY: AAKASH HEALTHCARE - SUPER SPECIALTY HOSPITAL, NEW DELHI, BY CDA ARCHITECTS

Hospitals undoubtedly fall under one of the most energy-intensive building types and therefore necessitate being energy-engineered to sublime its impact on the environment.
A targeted energy retrofit should boost any HVAC equipment's performance and reduce the pressure on the air conditioner. By reducing the amount of heat that needs to be withdrawn from the structure, known as the building cooling load, HVAC equipment may be downsized as well, lowering the building's overall energy usage and peak power consumption considerably.
For a healthcare project in Dwarka, New Delhi that CDA Architects had worked on in 2018, the interior design was conceptualised on a holistic consequence of the principle of healing architecture. The airy central courtyard designed as a 'Japanese Zen garden' with a play of levels, greenery, and a small water body. Similarly, the refuge area at the fifth-floor level landscaped into a healing garden fosters well-being amongst the in-patients. Curated around the principles of passive solar design, the longer side of the building aligns perfectly with the N-S orientation, ensuring abundant natural light in the building during most of the day. The large windows provide optimum daylight and regulated indoor air quality. Highly efficient DGU's [Plasitherm] allowed wide spans of the skin to be glazed for a substantial amount of natural light to penetrate the interior, thereby saving on the electrical energy use. Simultaneously, the glass's low - e value almost causes the heat gain, resulting in a reduction in heat load and adding to the overall energy savings.

7. A.K. Aakash Healthcare's building was conceptualised on a holistic consequence of the principle of healing architecture.