



STRONG CONTENDER

Glass, which is now tougher than ever before, is considered a viable choice for cladding as well as other complex structural purposes

BY ARUNA RATHOD

From store fronts and lobbies to the most stunning signature buildings in the world, the expanses of glass continue to get bigger, taller, more complex and ever more transparent. One of the most interesting structures built in the 21st century is the Time Warner Centre located in New York. This building utilises cable tension design at its main entrance façade and 'prow' structure. The prow is a three-sided transparent glass structure specifically designed to house large electronic signage. The horizontal steel elements that are visible are meant to support signage, and do not provide any structural support for glazing. The prow was constructed using a combination of low-iron glass, vertically-hung double steel cables and horizontal glass fins. Designs such as these testify to the many possibilities of glass as a structural material.

Making a point about glass facades in India, Somasundar-

am Senthilkumar, national sales head – Projects, Asahi India Glass Limited (AIS) observes, "Until a few years ago, energy efficiency was neither a practice nor a fad in the country. But with the launch of the Energy Conservation Building Codes (ECBC), accompanied by the gain in popularity of Green building practices, builders and architects have started looking for ways to reduce energy consumption in buildings. ECBC and the Green building movement are taking small steps in that direction."

Large multi-storeyed buildings with exterior glass walls have caught up in India, especially after the advent of the IT and IT-enabled services sectors. There have been instances of not-so-well-planned glass buildings that end up consuming high electricity for air-conditioning, as the glass often lets in too much heat. Contrary to this, the use of glass in buildings does not always lead to high energy costs, if properly designed.

1. New projects, like the Era Vuelta residential building by the Ravi Group, use glass extensively for the facade.



Architect Harsh Bhutani, managing director, ED&P Group (JV partner to A49 in India), explains, "Much depends on how the building is oriented — that is, which part of it is fronted by glass. To conserve energy, too much glass should not be placed on the west façade, especially in hot places. It's the west face that gets more of the hot sun. This indicates that one has to study the weather in a region to decide which part of the façade should have glass. Having glass on the north side of the building, for instance, does not increase the room temperature, as that part of a building never gets the sun. And if the maker intends to use glass on all sides or on the west or the south façade, then new types of architectural glasses — such as low-heat glass panels (which reflect most of the heat and provide maximum light inside) and sandwich panels (double-insulated glass windows) to cut out the heat and sound — should be utilised."

Glass is looked upon as the future of construction materials when all other materials get exhausted. While steel may rust eventually, corrosion does not affect glass. Due to its fragile nature, the use of glass to bring natural light into buildings was earlier restricted to windows and other small installations. "But due to the development of new construction techniques and glass production methods, the inner strength of this material is being revealed; and it is now considered a viable choice for more complex structural requirements," continues Senthilkumar.

Glass is being used on an unprecedented scale, creating remarkable designs today. The use of glass in façades gives a dramatic effect to the building. Glass panel façade systems offer versatile, high-performance coverage, with a wide range of stylish design possibilities. Ram Raheja, director and head - Architecture, S. Raheja Realty, explains, "Glass is undoubtedly one of the most popular building materials available, because it saves energy costs by providing natural daylight. It also controls light and allows the good rays indoors, while keeping the harmful ones out. Overall, it harmonises a structure with its environment and fits perfectly



With the available technology, glass is relatively inexpensive and recyclable, which is an important factor in the current era of sustainability. It was previously considered to be a fragile material; but in the light of current technology, glass has very strong and fire-resistant qualities which make it an attractive option for structural use. "Exterior glass is used as facades, skywalks, revolving doors, conservatories, etc, while interior architectural glass is used for staircases, walkways and even walls," maintains Raheja.

Raheja's project in Lonavala uses glass for aesthetics as well as practical purposes. "I wanted to add to the beauty as well as sustainability of the villas. One of the exterior walls of the bungalows has been made entirely of glass, and overhead canopies have been added to allow controlled quantity

2. ED&P used glass to create a striking facade for the BU Landmark complex.

3. Basesh Gala, director, Ravi Group.

4. KAS Menon, senior vice president, Sales & Marketing, HNG Glass.

5. At the BU Landmark complex, glass is used as per the



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6. Harsh Bhutani, MD, ED&P.

7. Somasundaram Senthilkumar, national sales head - Projects, AIS.

8. AIS Securityplus was used to create the hanging glass conference room at the AIS Glasxperts showroom.



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to give a feeling of space with the option of sealing off the walls when privacy is required," he adds.

Over a period of time, glass has evolved from being just a physical barrier to incorporating energy-efficient and safety features. It ensures comfort, light, ventilation and privacy; and by specifying the K-value of high-performance glass, the desired amount of energy in a room or building can be allowed or restricted. "The shading coefficient controls the amount of solar heat that enters, and this is exemplified by Insulated Glass Units (IGUs), which reduce heat without affecting light," explains KAS Menon, senior vice president, Sales & Marketing, HNG Glass. He points out that glass can be made into objects of different shapes or sizes, which can be used in interiors and exteriors of buildings. It is also low in maintenance compared to brick and mortar, and easy to install in exterior façades.

Glass is aesthetically sound, eco-friendly and economically viable. It is a smart, adaptable and versatile material, lending itself to endless possibilities – both in terms of design and functionality, across exterior and interior applications. All in all, glass stands in a league of its own. The reason for this is quite simple to understand: glass enhances the visual appeal of buildings, adds a touch of modernity and elegance, and helps the building gain recognition for its stylish and luxurious-looking architecture.

"Glass is, by its very nature, durable, tough and easy to maintain. By following a few simple guidelines, one can ensure that it stays clean and brilliant for many years. The glass panels should be cleaned after being installed (at the end of the project). The labels, cork interlayer and dirt should be removed, followed by washing with water. Glass panels should be cleaned regularly with water. Sometimes, a bit of neutral detergent can also be added. The frequency of cleaning depends on the surrounding environmental conditions and pollution levels," adds Senthilkumar.

The properties of glass, and the possibility of moulding it during manufacturing, have had a great impact on the creation of intricate designs. Glass technology has now given

SPECIALTY TINTS BY HNG

UltraWhite: Standard clear glass is actually far from clear. To make UltraWhite, Guardian uses a raw material formula that increases light transmission and neutrality while reducing the greenish tint that is most apparent in clear glass when viewed from the edge. This green tint becomes more visible as standard glass gets thicker. With this specialty tint, the result is pure, sparkling and very clear glass. Available in thicknesses ranging from 3mm to 12mm and sizes up to 130" x 204".

CrystalGray: Guardian CrystalGray is a new float glass substrate with a very light gray tint, ideal for a wide range of architectural glass markets. In addition to an attractive neutral colour, this glass offers an improved light to solar gain ratio compared to standard blue and gray tinted float glass. The technology behind it allows higher light transmission while reflecting infrared energy, thereby reducing the heat gain for many architectural applications. This new float glass, used in combination with Guardian's high-performance coatings, can help buildings achieve LEED certification.

Like standard float glass, all Guardian Specialty tinted glass can be used monolithically, tempered, laminated and fabricated. It can also be used on the exterior or interior of a vision insulated glass unit or in spandrel glass applications.

architects the privilege to express freedom in their designs. It is also known to be an excellent material for thermal insulation, which will serve the purpose of maintaining a particular temperature (hot or cold) inside the edifice. Coated glasses have a metal oxide coating applied to them, making them highly resistant and durable. No particular precautions need to be taken when the coating is positioned on the inside of the insulating glazing unit.

Basesh Gala, director, Ravi Group, explains, "Glass has



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brought about a drastic change in the built environment, particularly during the 21st century. The use of glass in an edifice has evolved from purely being an ornamental or architectural attribute to a structural value addition, thus paving way for glass technologies to move forward concomitantly with the augmented demand."

Although materials like concrete and metals have to go hand-in-hand with glass designs, most of the architects and planners have gone to extreme lengths to use glass fabric nowadays. "Glass is irreplaceable as an element of architecture, which imparts to a building so many desirable characteristics – such as safety, aesthetics, solar control, ease of maintenance, sustainability and so on. Technologies in glass designs hold a great future for more delightful yet enthralling architectural designs," he adds.

A commonly perceived notion is that glass compromises safety and security. However, continuous research and technological advances have changed that, making glass safer and more secure than it ever was. Solutions like laminated glass of various types are being widely used for the purpose of accidental protection.

"Laminated glass is a type of safety glass that holds together when shattered. In the event of breaking, it is held in place by an interlayer, typically of polyvinyl butyral (PVB), between two or more layers of glass. The interlayer keeps the layers of glass bonded even when broken, and its high strength prevents the glass from breaking into large sharp pieces. This produces a characteristic 'spider web' cracking pattern when the impact is not enough to completely pierce the glass," explains Senthilkumar.

Glass façade installations have come a long way from the initial years, all thanks to the consumption of glass for exterior facades – which reduces the construction time of a project by over 40 percent. Menon adds that products such as spider fittings, curtain wall glazing, façade systems, ACP, point fixing and frameless glazing are very popular.

Available in a variety of styles, colours, designs and textures, glass has the potential to create an ambience that can

WHAT GLASS CAN DO...

- Mirrors can bring about a complete transformation to interior design. The wide range of available effects, patterns and colours gives a contemporary and stylish look to the interiors.
- Glass screens and shower enclosures are specifically designed to cater to modern lifestyles, offering utility as well as aesthetic appeal. They are made of high-quality tempered glass which, apart from being extremely safe and durable, also provides a positive illusion of more space, making bathrooms seem larger. A shower enclosure adds beauty to the bathroom, giving it a contemporary look and, at the same time, fulfilling the basic criteria of a separate wet and dry area – leaving the bathroom looking great at all times.
- With recent innovation in glass and glass fittings, any design can be executed for glass stairways. Various designs can be explored in options of tempered, heat-strengthened, laminated glass with pipe handrails, fins, glass slides, etc.
- Glass can be transformed into a distinguished range of stylish yet functional furniture for home and office use. They provide customers with a perfect combination of style and strength. Variety of glasses such as lacquered, crackled, etched and frosted, can be used to create a sophisticated and contemporary range of furniture.
- Partitions, movable or fixed, are the creative answer for facilities that need a physical (but not a visual) barrier. Glass partitions include frameless, acoustic, weather-resistant, wood and custom-made glass dividers. They can be custom made in tempered, laminated or art glass.
- Balustrade is an important safety feature in the design of any building, but this doesn't mean the design of the balustrade itself cannot improve the aesthetics of the building. The use of glass in balustrades, either as a stand-alone material or in combination with a metal, can add significant prestige and value to a building.
- Lacquered glass can be used to give a fresh look to kitchens, as well as in humid environments. Functionally, it is hassle-free to clean and maintain, and hygienic as well. Glass that is lacquered is also durable and remains unaffected by moisture and scratches.
- It may come as a surprise to many people that glass can be the appropriate material for achieving privacy in homes and in other spaces, given that its defining characteristic – and its popular perception – is that it is transparent. However, few people know that glass is a versatile material which lends itself readily (functionally, ecologically, aesthetically and economically) for building and construction purposes in general, and as a privacy solution in particular. New and superior products, such as glass with integrated blinds, glass with view control film, and switchable glass, help in maintaining the connection between the inner and outer worlds while successfully creating a boundary between private and public space.

Note: information courtesy AIS

transform living and elevate lifestyle. Variety of glasses like lacquered, crackled, etched and frosted, tempered, laminated, ceramic frit, patterned, printed, etc, can be used to create sophisticated and contemporary interiors for home or office.

"When high-performance glass is used, there is reduction in power consumption and the interiors remain cool, as the heat gain is less when compared to other materials used in

9. Ram Raheja, director/head
— Architecture, S. Raheja.

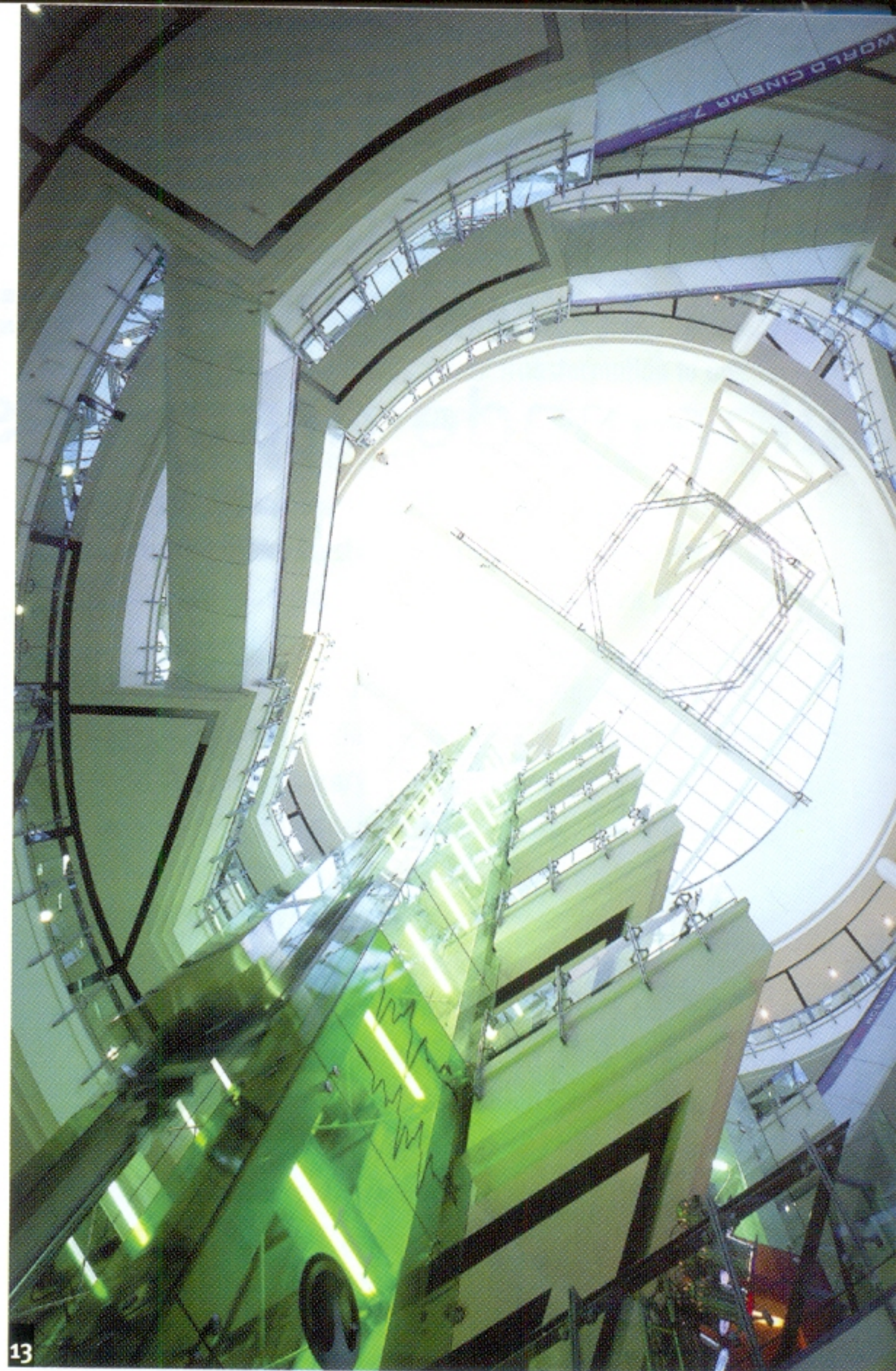
10. At Central World,
designed by ED&P, glass as
a balustrade provides for
aesthetics and safety.



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11. HNG float glass has high light transmission and can also be fabricated into a reflective glass.

12. AIS Ecosense Enhance is an energy-efficient glass with solar and thermal insulating properties.

13. The atrium at Central World shows how glass has evolved from being ornamental to adding to the structural value.

the façade. Higher light transmission results in lower use of artificial lighting," explains Menon.

Energy-efficient glass ranges from AIS, under the brand name of Ecosense, reduce heat gain in buildings without compromising on natural light. And in winter, they ensure solar gain. No matter what the season, people inside stay comfortable at all times. Using energy-efficient glass also helps in ensuring that the interiors, as well as the occupants, feel more comfortable.

Ecosense comes in three ranges: Enhance (solar control), Exceed (solar control low-E) and Essence (low-E) high-performance glasses. Ideal for solar and thermal insulating parameters, Ecosense combines aesthetics with environmental sensibility and conforms to all international and national Green standards, making it the natural choice for those looking for a Green Building solution.

Ecosense performance parameters such as visual light transmission, solar factor, u-value and internal reflection, make buildings more efficient and ecologically viable. These energy-efficient products, when used properly, can reduce the total energy consumption by anywhere between

8-10 percent of the total energy consumed and, hence, the accrued benefits of using these glasses keep growing over the years. Furthermore, it is not just the recurring savings, but also the reduction in capex because of the lower energy loads required for air-conditioning the building, that further augments the versatile nature of these glasses.

The range of specialised laminated glass from AIS includes Valuglas (heat-strengthened laminated glass with 1.14mm PVB interlayer), Securityglas (intrusion-resistant laminated glass with 1.52mm PVB interlayer), Securityplus (Dupont Sentry glass interlayer makes it five times stronger and 100 times stiffer than conventional laminating materials) and Acousticglas (noise-cancelling glass). Due to the superior features, these glasses are extensively used for doors, windows, facades, canopies, glass flooring, staircases, etc.

HNG's Guardian glass (float glass) is manufactured around the world using the latest glass-making technology to produce float glass for a variety of applications in a wide range of sizes and thicknesses. It has high light transmission, optical clarity and can be further fabricated into reflective, low-E, laminated, security, insulated, heat-treated and ceramic decorated glass.

The clear glass is ideal for use where high visibility and clarity are required. Thickness ranges from 1.7mm to 12mm. It can be used for windows, greenhouses, atriums, tabletops, shelves, doors, mirrors, furniture application and lots more. The bronze and grey coloured glass is suitable for areas where reduced light transmission and reduced solar heat gain are required, and when colour is desired to enhance aesthetics and increase design flexibility. It is available in standard thickness of 3mm, 5mm and 6 mm; other thicknesses may be available on request.

Typically, the heat gained or lost through glazing in a normal building in India is anywhere between 40-50 percent; and using the right type of glass can bring down the energy consumption by 30-40 percent (only glazing). Additionally, the incremental cost for high-performance glazing can be recovered in a time span of three to four years. **A&I**