

Glassy Glamour

The aesthetics and functionality of glass as a construction material are being continuously enhanced by technology, making it the hot favourite of architects, designers and builders alike.

In this apartment, ZZ Architects have used tempered glass for the large windows to protect the room from heavy sea winds without interrupting the view.





→ Innovative use of glass at the Manthan office designed by Sandhya Seth provides a visual link between the two areas.



↑ The ETO office in Mumbai designed by ZZ Architects uses a special low E glass with metal facade panels that enhance the thermal performance of the building.

In the last few years, the use of glass in construction has been gaining momentum in India. The skylines of cities are getting filled with glass buildings exuding glamour, affluence and style. Glass cladding came to the forefront when multi-national companies and hotels opted for it to keep pace with international trends. The ripple has turned into a wave, with glass sweeping across architectural and interior designs of many structures – from offices, retails, hospitals, multiplexes to even high-end residential projects. The reasons for the enthusiastic adoption of glass are not hard to find – it offers unlimited aesthetic options combined with functional advantages. Also, technology has made it possible to mould glass into any

shape and enhance its strength and other properties, thereby changing the dynamics of design. Keeping step with this trend, the Indian glass industry has grown manifold over the last decade, with a number of Indian and international companies offering a plethora of products and solutions.

The case for glass

Glass blends well with several other building materials like aluminium, steel, wood, and concrete. It imparts a trendy hi-tech look and heightens the sense of lavishness and comfort. It is a miracle worker when it comes to reflecting light and illuminating surfaces, thus enhancing the interiors as well as exteriors.

The utilitarian advantages of glass are as

CN RAGAVENDRAN, Partner, CR Narayana Rao

Since the last decade, offices, particularly IT offices, have been occupying large floor plates with more than 500 people occupancy on one floor. The central part of such large offices often had no access to natural day lighting and people sitting in these inner areas had no visual contact with the exterior, which psychologically impacted their well-being and work productivity. Hence, effort has been made to enhance the day light penetration, at the same time preventing glare and transmission of solar radiation. Glass technology, which has undergone tremendous innovation during the same period, has come to play an important role in architectural design, particularly the envelope design. With the availability of high performance glass, the extent of day light transmission and the radiation being transmitted through the glass can be controlled to specific requirement levels.

An architect has to examine the appropriate orientation of the building in relation to the sun path at building location and understand the impact of solar radiation and day lighting with the help of modern tools like Eco-Tect, day light analysis, radiation analysis, etc. This helps an architect to precisely model the exterior façade and

appropriate mix of glass, shading, light wells, sky light, etc. that will enhance penetration of natural day lighting, external visual connection, and better thermal comfort, while maintaining the overall efficiency of air-conditioning.

Generally, basic methods of high performance building façade design include: orienting and developing geometry and massing of the building to respond to solar position and radiation with enhanced day lighting; considering natural ventilation and solar shading to control cooling loads, improve thermal comfort and enhance air quality; minimising energy used for artificial lighting, mechanical cooling by optimising exterior wall with insulation; thermally broken framing for less heat conductivity, high light transmittance with low solar heat gain co-efficient and heat transfer co-efficient (U value) insulated high-performance glass with low-E coating using single or double or triple layer silver or appropriate metal coatings.

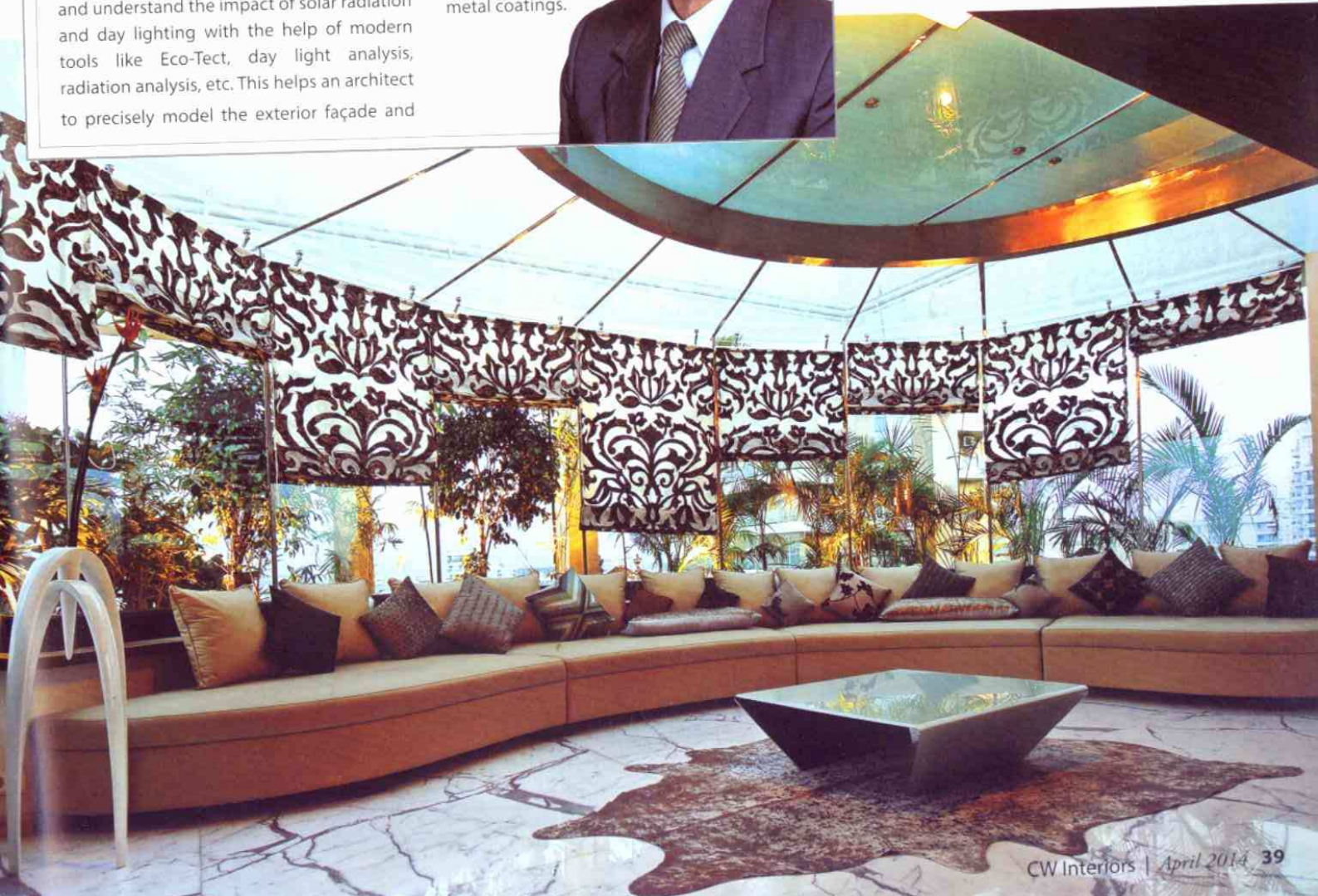


Bottom

↓ This living room in a penthouse in Mumbai designed by ZZ Architects with the glass dome ceiling and bordering glass panels exudes luxury and style, and also lets in ample daylight.

Below

↓ At the HCC 247 Park at Mumbai, Chennai-based architectural firm CR Narayana Rao has used high performance double glazed glass with colour-neutral coating consisting of multiple stacks of metal to reduce heat gain and glare while permitting light transmission.



numerous as the aesthetic ones. As a far lighter material than concrete or wood, it reduces the load on the building foundation. Being less thick than concrete, it also serves to increase the carpet area. Glass also brings in natural light, lowering the energy consumption significantly if the right kind of glass is used. It offers the occupants outside views, at the same time keeping them insulated from the noise and dust. Durability, ease of installation and hassle-free maintenance are its other plus points.

Some questions

Even as glass makes strong inroads into the Indian architectural landscape, there is a section of people asking some very relevant questions. Is glass really as environment-friendly as it is claimed to be? Is it suitable for India's tropical climate? Glass traps heat, on the same principle on which greenhouses work. Buildings with high usage of glass can get overheated, pushing up the energy requirement for keeping it cool. Glass also poses safety concerns when it comes to fire, burglary and bomb blasts.

The software campus at Hyderabad designed by CR Narayana Rao has been provided with high performance insulated glass with double silver Low 'E' coating on the outer glass, having VLT more than 40 per cent with low solar factor as close to 0.2.

VIKRAM KHANNA,
COO, Architectural Institutional Business,
Asahi India Glass Ltd

At a time when the construction industry is looking for ways to reduce energy consumption, improve safety parameters and enhance the aesthetics of commercial and residential spaces, glass presents itself as a viable, attractive and economical option. A wide range of new and advanced products are available to realise these possibilities - tinted glass, tempered glass, laminated glass, acoustic glass, insulated glass units, heat-reflective glass, solar control glass and low-e glass, to name a few.

High-performance solar control glasses are best suited for India. These energy-efficient products, when used properly, can reduce the total energy consumption by anywhere between eight to 10 per cent. Using the right type of glass can bring down the energy consumption by 30 to 40 per cent. The incremental cost for high performance glazing can be recovered in three to four years. Asahi has introduced a range of high performance glasses like Ecosense under three categories - Enhance (Solar Control), Exceed (Solar Control Low-E) and Essence (Low-E). Continuous research and technology advances have made glass safer and more secure, like laminated glass that holds together when shattered.





DINESH TRIPATHI,
Managing Director, NSD Global Trade

Glass has great aesthetic value. Apart from creating a sense of space, it is also cost effective and eco-friendly, all of which has increased the use of glass in construction. The safety aspect has also been enhanced with specialised glasses like PVB Laminated, Sentry plus Laminated, Bullet Proof and Burglar Proof to counter eventualities like burglary, fire, bomb blasts, etc. We process all kinds of hard-and soft-coated glass, including laminated, DGU, and SKN Series.

At De' Pizza Mania restaurant in Mumbai, Design Seal Studio has used glass innovatively to create a circular cut out on the wall dividing the kitchen from the restaurant.

ANUJ BERRY, Managing Director,
Classical Symphonies

Our company, which has brought in an array of Murano glass products and artefacts to India, will be launching Murano glass that can be used in buildings next month. Samples are already available with us. Murano in Italy is synonymous with glass making around the globe. They have been making artefacts, tables, centrepieces, sculptures, etc, for centuries. Recently, after much research, the glass makers here have come up with a technique to produce glass for usage in buildings. It can be used for façades, doors, windows, ceiling, flooring and partitions. The toughness and the brilliance of this glass is sure to leave one spellbound. This glass has been used in some buildings in the Gulf and the US.



The solution

The industry pundits, however, maintain that all these issues can be tackled with a suitable design solution that takes into consideration several factors like surface orientation, solar radiation, structural loads, wind loads, thermal stress, etc. They also aver that there are myriad new forms of glass that can cut down heat and

glare transmission and counter burglary and bombing threats. Organisations like the Indian Green Building Council and the Bureau of Energy Efficiency, which introduced the energy conservation building code, are also helping in designing buildings which are energy efficient and environment-friendly.

We speak to some industry majors and professionals to see have to say about glass...



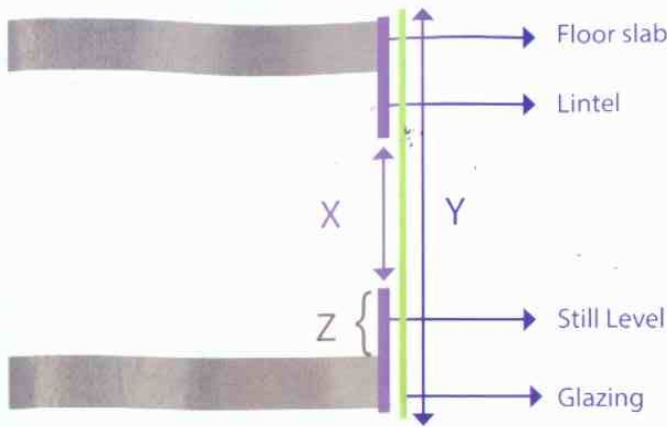
CR Narayana Rao used a high performance insulated glass with single silver Low-E coating and 30 per cent VLT, solar factor close to 0.2, and high reflectivity to control the glare at the Anna Centenary Library in Chennai and yet maximising the daylight received by the library block.

KEY PERFORMANCE FACTORS ON FAÇADE AND GLAZING

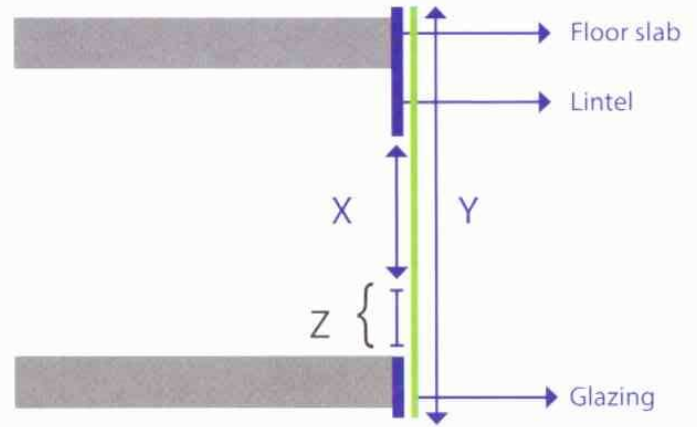
(Inputs provided by CN Ragavendran, Partner, CR Narayana Rao LLP, Chennai)

WINDOW WALL RATIO-WWR

The optimal WWR should be based on the floor plan of a space, the occupant's positions in the space and the type of occupant's activities. Energy Conservation Building Code recommends WWR in the range 30 to 40 per cent, depending on the occupancy, orientation of the building and area of floor plate.



General Case

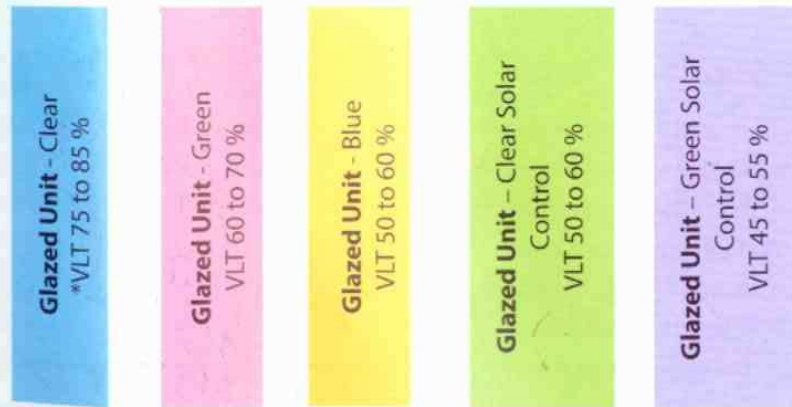


Efficient Case (Z portion also Glass to maximise day light inert)

Lighting energy:

Light Transmission.

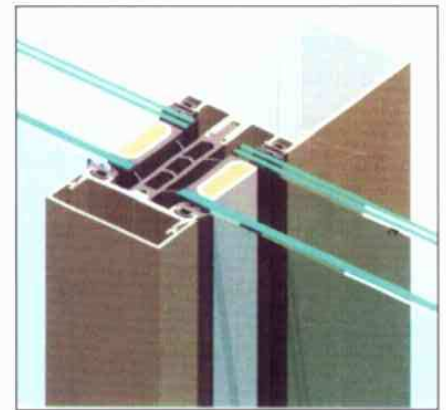
Factors affecting light transmittance based on tint and effective coating on the glass while using single or insulated glass on the façade.



*VLT - Visual Light Transmissions

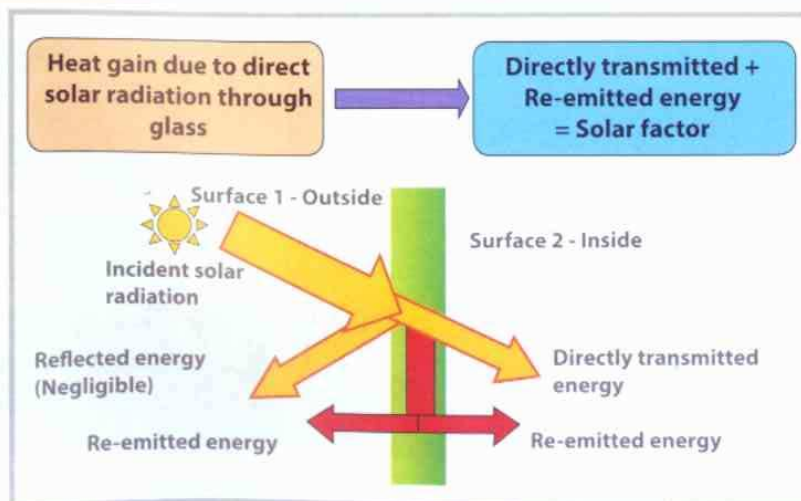
Performance criteria :

Provide a façade assembly strategy that will be as airtight as possible by sealing all gaps to control uncontrolled movement of air through the façade, which in turn improves the efficiency of AC system and corresponding energy loads. Thermal break system windows/ glazing also helps to reduce the heat conductivity and improves its acoustic property.



Cooling Energy :

- Total Heat Gain or Heat Transmission
- SHGC or SF: Solar Heat Gain Coefficient or Solar factor
- Heat transfer co-efficient - U Value.
- Light to Solar Gain Ratio - LSG (Higher LSG ratios are appropriate for façades located in warmer climates, to keep SHGC as low as possible.
- Occupant comfort



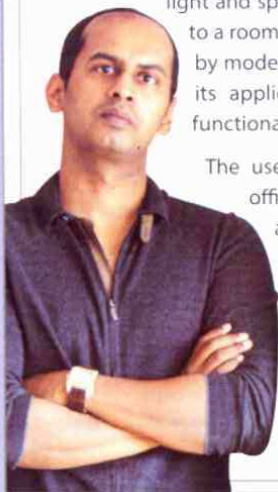
Energy efficient opaque walls:

- Insulated wall.
- Double skin façade.
- Ventilated façade.

ZUBIN ZAINUDDIN, Principal Architect, ZZ Architects

Today's glass technologies allow large commercial buildings to make the most of natural daylight while protecting the environment and conserving energy. Glass also offers dynamic interior design solutions that can maximise the impression of light and space, and add colour and movement to a room. High glass strength, made possible by modern technology, extends the range of its applications beyond the decorative to functional and even structural roles.

The use of glass in public buildings and office complexes has steadily increased and the trend is set to continue. In residential spaces, glass can be used in skylights to filter in natural light. The subtle qualities of glass work perfectly in combination with other materials like wood, concrete and metal.



At the RNA Corp in Mumbai, Asahi India's AIS Enhance Pine glass used in the facade allows optimum light to pass through while reflecting away a large degree of heat.

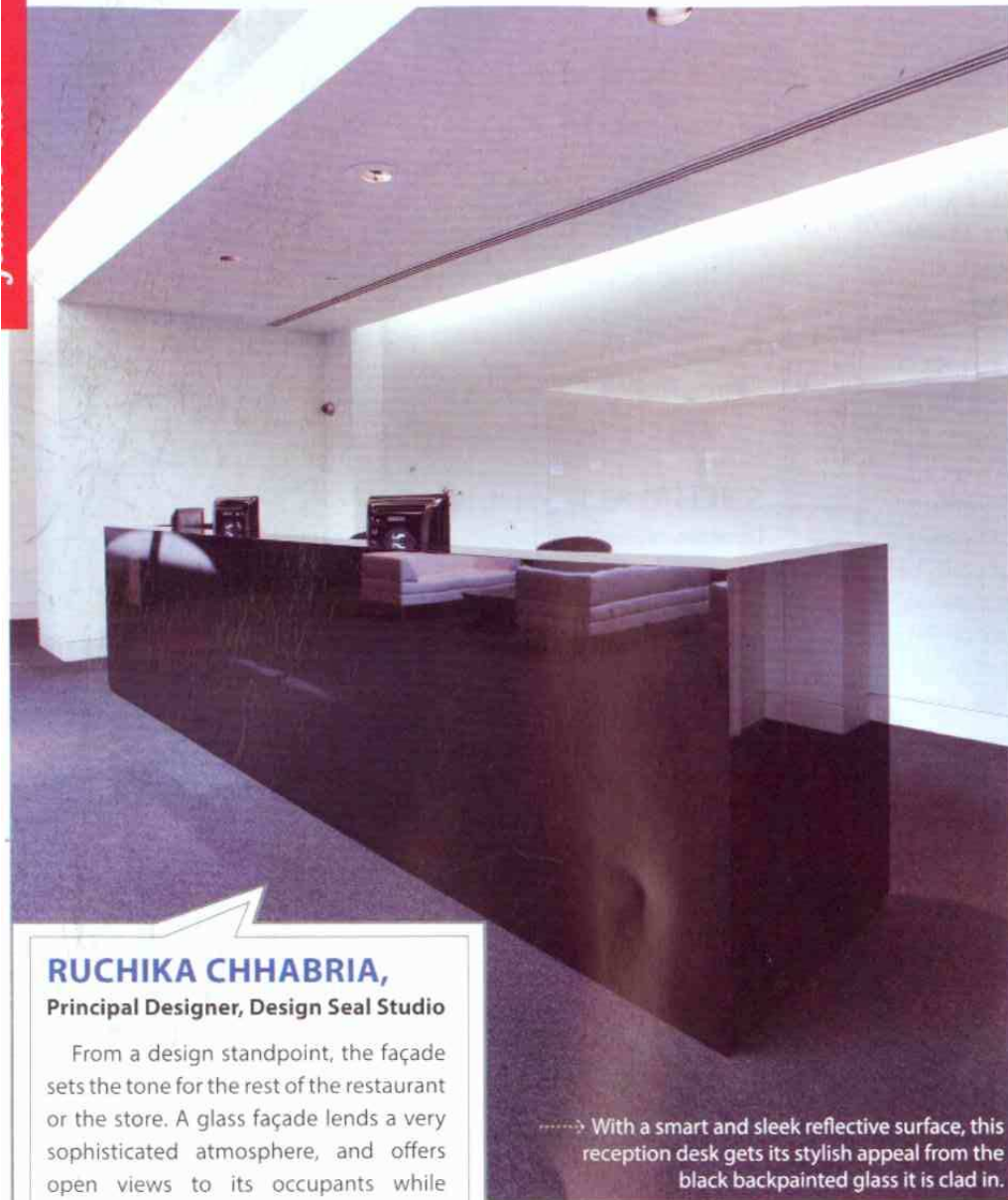


SNEHAL GANDHI, Director, Jayantilal J Gandhi

Glass is predominantly used in façades of commercial complexes like malls, offices, hotels, and to some extent in residential high rises and in office interior partitions. Factors such as project location, budget, performance criteria of the building, technical aspects like thermal insulation needs, HVAC (heating, ventilation, and air conditioning) requirements, maintenance of the glass façade after installation et al play an important role while designing glass envelopes. Designing the façade wall for optimising the performance of the façade, usage of glass and other components is important. An optimised design will de-clutter the façade wall and minimise the use of glass fittings, thereby optimising the cost and enhancing the aesthetics.



The large glass windows at the Manthan office designed by Sandhya Seth maximise on the view.



RUCHIKA CHHABRIA,
Principal Designer, Design Seal Studio

From a design standpoint, the façade sets the tone for the rest of the restaurant or the store. A glass façade lends a very sophisticated atmosphere, and offers open views to its occupants while accentuating the interior elements and enticing the customer to enter the zone. It avoids external wastage. Huge glass windows make the area look voluminous with natural lighting. A glass display adds dimension and narrates an enchanting story to the passerby.

Today, vinyl film on glass is a favourite variant. It is available in various colours and can be transparent, translucent and opaque. It can be used to create endless designs, various forms of typography and branding of the restaurant or store. Sand blasted and stained glass with metal frames is back in trend. Glass used in interiors and architectural structures is extremely tough and durable. The difficulty in working with irregular shapes is probably the biggest disadvantage of using glass; it can be risky to use and install if it is not well-tempered.



With a smart and sleek reflective surface, this reception desk gets its stylish appeal from the black backpainted glass it is clad in.

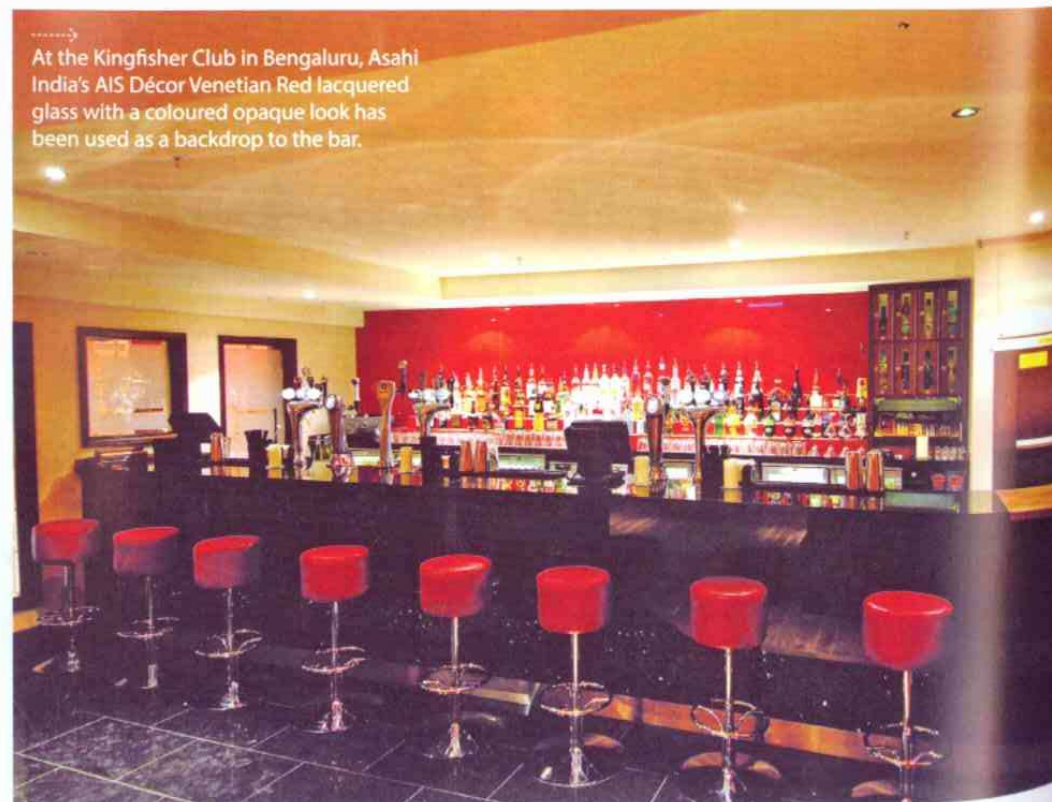
KAILASH JAIN,
President, HNG Float Glass Ltd

Glass is an ideal material for construction because of its non-corrosive nature, adaptability to various applications, design flexibility, aesthetic appeal, energy saving and sound insulation properties. The Indian glazing market has grown in value from Rs 100 crores in 2000, to Rs 5000 crores today. The glass market is estimated to increase at a compound annual growth rate of 15 per cent over the next three years.

The demand for glass in India is powered by the beverage sector and real estate sector, which use container glass and flat glass respectively. The opening up of FDI in the real estate sector has led to a greater demand for international standards in construction. This, along with the ever-growing popularity of glass as a material, and technical innovations happening in the product will ensure its healthy growth. Our company, which



manufactures clear float glass, lacquered glass and frosted glass, has plans to produce reflective glass and low-E glass soon, in anticipation of these trends.



At the Kingfisher Club in Bengaluru, Asahi India's AIS Décor Venetian Red lacquered glass with a coloured opaque look has been used as a backdrop to the bar.



Glass skylights are a great option to bring in natural light within a temperature controlled environment.

TEXT: Janaki Krishnamoorthi

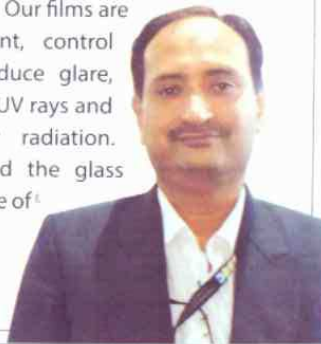
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DEEPAK MEHTA, Senior General Manager-Sales and Marketing, Garware Polyester

The concept of architectural films is relatively new and yet to catch on in the Indian construction industry. The size of the architectural film market in India is approximately 10 per cent of glass usage and it is growing at 15-20 per cent annually. Architectural films are currently used largely in corporate offices, hotels, malls, hospitals, banks and airports. There are eight categories of architectural films available in India. While architectural films are used in façades and windows, decorative films are used in doors and partitions.

Garware is the pioneer and leading manufacturer of Suncontrol Window Films for application in the architectural segment and the only Indian manufacturer in the world to manufacture polyester film using a patented dye technology. We manufacture a variety of films for architectural applications – from Suncontrol, safety, security to privacy and aesthetics. Our films are energy efficient, control solar heat, reduce glare, block harmful UV rays and mobile tower radiation. They also hold the glass together in case of high impact.



Glass is here to stay in building construction, and its usage will only grow in the years ahead. The selection of the right glass is crucial, and the right design solution, combined with good engineering, workmanship and meticulous execution will ensure that the material is used in the most optimal way. **i**