Cutting-Edge Cladding Solutions

Smart & Environmentally Responsible Choices

Cladding of buildings is one of the most expressive, inspiring and complex aspects of building design. The basic function of an envelope or enclosure of a building or structure is to protect the covered or otherwise conditioned interior spaces from the surrounding environment. Cladding is the application of one material over another to provide skin or layer intended to control the infiltration of weather elements, or for aesthetic purposes.

The façade is required to fulfil a wide range of technical and architectural roles, including weather tightness and structural. The cladding has to protect a building from moisture and wind and is an integral part of a wall assembly, responsible in surprising ways for a building's overall thermal performance. A wholesome building should provide an acceptable level of thermal comfort with minimal environmental impact.

The façade and cladding industry has gone through a sea change in the past decade. The market is flooded with materials of different textures and colours. WFM Media spoke to many experts in the construction sector including architects, façade consultants, manufacturers of cladding materials and civil engineers on the advancement in the cladding sector and the newest in cladding technology and materials. Here is what experts have to say about the latest in the industry.

Cover Story

An interesting project by Rivermind Design LLP

AR. GAGANDEEP KAPILA
Co-Founder & Principal Architect, WMA

AR. VIKRANT SHARMA
Founding Partner and Principal Architect, Hivemind Design LLP

BAKUL CHANDRA
Co-Founder, Mentor & Design Strategist, Renascent Consultants

EXTERIOR CLADDING MATERIALS - IMPACT ON BUILDING'S COMFORT AND SUSTAINABILITY

Cladding materials play a critical role in creating a comfortable and sustainable building. According to **Ar. Vikrant Sharma, Founding Partner and Principal Architect, Hivemind Design LLP**, exterior cladding materials reduce heat gain and provide insulation, regulating interior temperature and minimising energy consumption. Additionally, these materials ensure a comfortable temperature inside by controlling heat transfer and reducing the energy footprint of the building.

Graphic Era global school by Renascent Consultants

Cladding acts like a building's thermal envelope, says **Ar. Gagandeep Kapila, Co-Founder & Principal Architect, WMA.** "We prioritise materials with high thermal resistance, like insulated concrete panels or rainscreen systems. These create a barrier, reducing heat transfer in summer and heat loss in winter. This translates to a comfortable interior environment while minimising energy use for heating, ventilation, and air conditioning (HVAC) systems. We also explore materials like terracotta or fibre cement that offer natural ventilation through their breathability, further reducing reliance on mechanical cooling", adds Ar. Kapila.

Bakul Chandra Co-founder, Mentor & Design Strategist, Renascent Consultants adds that exterior cladding materials play a crucial role in determining interior comfort and sustainability by providing insulation, weather protection, solar heat control, durability, moisture management, and aesthetic enhancement. The choice of environment-friendly and energy-efficient cladding options can significantly improve the overall performance and sustainability of any building.

A project by WMA, showcasing different cladding materials

Innovative cladding design by WMA

INNOVATIVE AND HIGH-DEMAND CLADDING MATERIALS

The world of cladding is constantly evolving and we're excited about some innovative materials. **Prefabricated lightweight aggregate concrete** (PLAAC) panels are gaining traction, reveals Ar. Kapila. These offer superior insulation due to air gaps within the panels and allow for rapid construction due to prefabrication. **Bio-composite cladding**, made from recycled materials like wood fibres and natural resins, is another favourite. It boasts excellent sustainability credentials and a unique aesthetic, making it a win-win for design and the environment, adds Ar. Kapila.

Innovative materials are used to reshape exterior cladding in architecture while meeting sustainability objectives. According to Ar. Vikrant Sharma, **perforated meshes** are in high demand as they offer versatile applications. A great way to use them is as a Jaali, which can be used over solid and glass façades. **Stone** is used mainly when dry-clad, as advancements in **CNC milling techniques** have also made it easier to develop intricate designs.

"We at Hive prefer **lightweight porcelain tiles** like those offered by Laminam. They address modern needs with durability and design flexibility. Laminam and many other brands' commitment to sustainability is evident in their continuous improvements. There is a global trend towards responsible purchasing practices, and our sustainable choices align with those trends", adds Ar. Sharma.

According to Chandra, some of the innovative materials for exterior cladding gaining popularity due to their sustainability, durability, and aesthetic appeal are **Fibre Cement, Reclaimed Wood, Metal Panels, High-Pressure Laminate (HPL), Glass Reinforced Concrete (GRC) and Natural Stone Veneer. Bio-based Materials such as bamboo, cork, or recycled plastic** are also emerging as eco-friendly options for exterior cladding. Their respective demand often depends on personal preferences, architectural trends, and sustainability goals. However, materials that offer a combination of sustainability, durability, and design flexibility tend to be highly sought after in the current market. Additionally, materials with low maintenance requirements and energy-efficient properties are also gaining popularity

APPROPRIATE CLADDING FOR ENERGY EFFICIENCY, BETTER ACOUSTICS AND OPTIMAL DAYLIGHTING

Façade cladding can be strategically used to achieve significant energy efficiency and cost-effectiveness of buildings. Additionally, cladding materials play a crucial role in acoustics, with some materials absorbing sound to improve indoor ambience.

A project by Hivemind Design LLP

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AR. KAVITA BATRA
Founder and Principal Architect, Unifyy

Ar. Kavita A Batra, a graduate of DCRUST, and the principal architect of the firm Unifyy says that the façade cladding enhances energy efficiency by providing insulation and reducing heat transfer, thereby lowering heating and cooling costs. Different materials impact acoustics differently; for instance, porous materials like wood may absorb sound, while metal may reflect it. Cladding designs can also affect daylighting, with features like larger windows or reflective surfaces maximising natural light penetration. Properly selected cladding materials mitigate heat ingress, maintaining comfortable indoor temperatures and reducing reliance on HVAC systems. Overall, strategic cladding choices contribute to energy conservation, cost savings, and improved indoor environmental quality.

Modern cladding trends prioritise materials like zinc, porcelain, and composite panels, blending durability with architectural elegance. Neutral colour palettes with subtle variations are popular choices for cladding finishes, imparting a timeless and sophisticated appearance. Dynamic cladding designs integrate geometric shapes and asymmetrical compositions, creating visually striking façades that stand out in urban landscapes.

Graphic Era global school by Renascent Consultants

Metal panels with a high Solar Reflective Index (SRI) reflect sunlight, reducing heat gain within the building, notes Ar. Kapila. Cladding systems with proper air cavities promote natural ventilation, further lowering cooling needs. "We should also consider acoustics during the design phase. Materials like wood or fabric panels have sound absorbing and diffusing properties, creating a quieter and more productive environment for occupants. Further, the integration of overhangs or fins on the façade controls daylight penetration. This optimises natural light while minimising glare and heat gain," says Ar. Kapila.

Ar. Sharma agrees that façade cladding acts as a protective barrier, providing insulation to regulate indoor temperature and reduce the need for excessive heating or cooling. This insulation capability not only enhances comfort but also lowers energy consumption, thereby reducing utility costs. Certain materials with high thermal reflectivity help mitigate the urban heat island effect, leading to a cooler environment and further energy conservation. By carefully selecting cladding materials based on their thermal properties, acoustic characteristics, and sustainability factors, architects and builders can create environmentally friendly and economically viable buildings, ensuring long-term benefits for occupants and the environment alike, explains Ar. Sharma.

What are the effects of cladding materials on acoustics, daylighting, heat ingress, and energy conservation? The choice of façade cladding materials and their use in design strategies directly impacts energy efficiency, indoor comfort, and cost-effectiveness of buildings by influencing insulation, air tightness, solar heat gain, daylighting, acoustics, and maintenance requirements. By selecting appropriate cladding solutions that prioritise energy conservation and occupant comfort, building owners can achieve significant long term savings while creating sustainable and high-performing built environments, says Chandra.

THE TRENDS IN CLADDING DESIGN, MATERIALS, AND COLOURS

There's a resurgence of natural materials in cladding design. Wood with advanced finishes for durability and weather resistance is making a comeback. We're also seeing a rise in **textured metal panels** that offer a contemporary aesthetic. However, observes Ar. Kapila, the most exciting trend is the integration of **biophilic design principles**. Vertical gardens or planter systems incorporated into the façade create a connection to nature and enhance building aesthetics.

Graphic Era hospital (Dehradun) by Renascent Consultants

Ar. Sharma also agrees that metal has emerged as a prominent choice, prised for its durability, versatility, and customisable nature. From solid panels to perforated or faceted designs, **metal** offers a plethora of options to suit various architectural styles. Additionally, the availability of different finishes adds to its appeal. It's also lighter than stone cladding.

Wood replicating **polymers** and **reconstituted wood** has also gained popularity, offering a natural aesthetic with good thermal properties. Slatted panels or screens mimic the look of wood while providing durability and ease of maintenance. While not as customisable as metal, wood cladding adds warmth and texture to building exteriors.

Cladding inspirations by Ar. Prashant kochhar, LTDF

Chandra, says that there is a growing preference for environmentally friendly cladding materials such as **reclaimed wood, recycled metal, and bio-based composites** with textured finishes are being used to add visual interest and depth to façades. Biophilic colours, earth tones and dark hues are trending for creating striking contrasts and contemporary aesthetics. Metallic Finishes are adding a touch of luxury and sophistication to modern architectural designs. Clean lines and minimalist profiles are favoured for achieving a sleek and contemporary look, with an emphasis on simplicity and understated elegance. Geometric patterns and asymmetrical designs are being used to create dynamic façades that play with light and shadow. This reflects an overall emphasis on creating visually striking yet functional building exteriors.

AR. MUKESH BHATIA
MD,
SSB Architects

Ar. Mukesh Bhatia, MD, SSB Architects notes that exterior cladding materials significantly influence interior comfort and sustainability by regulating thermal performance, moisture management, and indoor air quality. Sustainable cladding options, such as natural wood or recycled materials, contribute to a healthier indoor environment and reduce energy consumption. Properly selected cladding materials enhance insulation, mitigating heat loss or gain and minimising the need for mechanical heating or cooling systems. Moreover, cladding materials impact acoustic properties, daylighting levels, and overall energy conservation within the building. By prioritising sustainable and high-performance cladding solutions, architects can create spaces that promote occupant well-being, minimise environmental impact, and optimise long-term sustainability. High-performance materials like insulated metal panels (IMPs), terracotta, and bio-based composites are experiencing increased demand for exterior cladding applications. IMPs provide excellent thermal insulation and weather resistance, making them ideal for energy-efficient building envelopes. Terracotta cladding offers timeless aesthetics, durability, and sustainability, making it a popular choice for contemporary architecture. Bio-based composites, derived from renewable sources like agricultural waste or biopolymers, offer a sustainable alternative to traditional cladding materials while providing comparable performance. These innovative materials address the growing demand for sustainable building solutions while offering architects versatile options for exterior cladding.

CLADDING MATERIALS DIFFER BASED ON BUILDING TYPE

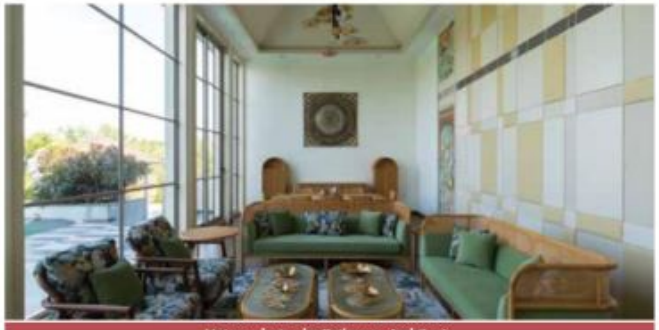
The choice of cladding materials differs according to the specific building type. The prevailing trend across all sectors is uniqueness; we also prefer deviating from standardised approaches to create distinct façades reflecting each building's identity. Customisation is the key for us, allowing for unique designs tailored to specific project requirements. Whether it's a residential neighbourhood or a bustling commercial complex, cladding choices

AR. PRASHANT KOCHHAR
Founder and Principal Architect, LTDF

Ar. Prashant Kochhar, Founder and Principal Architect, LTDF opines that exterior cladding materials play a vital role in determining interior comfort and sustainability by providing insulation, weather protection, and aesthetic appeal. Sustainable cladding options, such as recycled metal panels or fibre cement, contribute to energy efficiency and reduce the building's carbon footprint. Also, cladding materials influence acoustic performance, daylighting levels, and thermal comfort within the building. By selecting cladding materials with high thermal resistance and low environmental impact, architects can improve energy efficiency and indoor environmental quality. Furthermore, innovative cladding solutions, like green walls or photovoltaic cladding, offer opportunities to integrate renewable energy generation and biophilic design principles, further enhancing the building's sustainability credentials. Innovative materials such as cross-laminated timber (CLT), photovoltaic cladding, and recycled metal panels are in high demand for exterior cladding applications. CLT offers structural stability, thermal performance, and aesthetic appeal, making it a versatile choice for sustainable construction. Photovoltaic cladding integrates solar cells into building façades, enabling renewable energy generation while providing weather protection and design flexibility. Recycled metal panels, made from reclaimed materials like aluminium or steel, offer durability, corrosion resistance, and environmental benefits. These innovative materials align with the increasing emphasis on sustainability in the construction industry, offering architects and developers practical solutions for energy-efficient and environmentally friendly building envelopes.

are driven by a desire for individuality and innovation.

Residential buildings often benefit from warm and inviting materials like wood or stone veneer that create a sense of character. In contrast, commercial spaces might utilise metal panels, glass façades, or fibre cement for a sleek and modern look that reflects professionalism. Healthcare



Unique design by Rajkumar Architects

Mansarovar global university by renascent consultants

facilities prioritise a calming and serene environment, so we might use light-coloured materials like precast concrete panels or terracotta rainscreen systems to achieve this ambience, explains Ar. Kapila.

Ar. Sharma too agrees that residential settings often favour traditional materials like stone, and commercial and institutional buildings increasingly opt for composite metal panels due to their durability and versatility.

Chandra observes that trends in cladding for different end-use applications reflect a combination of functional requirements, aesthetic preferences, and sustainability goals specific to each building type. In residential buildings, natural & sustainable materials with modern aesthetics and biophilic design character are preferred. In commercial buildings, high-performance materials which may reflect the brand identity and a dynamic façade are preferred. In commercial buildings, durable and low-maintenance materials with diverse aesthetics are preferred. In healthcare buildings, hygienic and anti-microbial materials that promote healing and well-being are preferred. In office buildings, smart and sustainable solutions including energy-efficient glazing, solar shading devices, and integrated building management systems are preferred. Lastly, in industrial buildings, robust and protective materials with minimum maintenance are preferred.

FIRE SAFETY STANDARDS FOR CLADDING MATERIALS

Fire safety is a top priority when it comes to choosing cladding materials. We only use cladding materials that meet or exceed stringent fire resistance ratings established by local building codes, says Ar. Kapila. This might involve using non-combustible materials or cladding systems with fire-resistant barriers. However, safety goes beyond fire. We consider materials resistant to vandalism and those that contribute to the overall security of the building.

Fire safety standards for cladding materials prioritise non-combustible options, ensuring the entire cladding system remains non-combustible to prevent the spread of fire and smoke through the façade, notes Ar. Sharma. The Grenfell Tower tragedy highlighted the need for stringent fire safety regulations, prompting global revaluation of cladding materials even here in India. Other concerns regarding cladding materials include structural integrity and weather resistance. Measures such as fire resistant barriers and proper installation techniques are crucial to safeguarding buildings and occupants.

Ar. Rajkumar Kumawat, Founder and Principal Architect, Rajkumar Architects observes that cladding trends are a reflection of society's evolving tastes and aspirations, blending tradition with innovation to create visually stunning façades. Sustainable materials like reclaimed timber and recycled metal panels are having a moment, adding character and texture to buildings while championing environmental responsibility. Meanwhile, bold colours and geometric patterns are making a comeback, injecting personality and vibrancy into urban landscapes. Architects are pushing the boundaries of design with dynamic façades that respond to their surroundings, blurring the lines between art and architecture. As buildings become canvases for self-expression, cladding trends continue to evolve, celebrating diversity and creativity in the built environment. Cladding trends vary across different sectors, reflecting unique needs and design philosophies. In residential architecture, there's a resurgence of interest in natural materials like stone and timber, evoking a sense of tranquillity and connection with nature. Commercial buildings often feature sleek and minimalist cladding designs, projecting a contemporary and professional image. Healthcare facilities prioritise functionality and hygiene, opting for durable materials like stainless steel and antibacterial coatings. Offices are embracing biophilic design principles, incorporating living walls and green façades to promote employee well-being. Industrial structures prioritise durability and resilience, with materials like corrugated metal and reinforced concrete offering robust solutions for demanding environments.

AR. RAJKUMAR KUMAWAT
Founder and Principal Architect, Rajkumar Architects

Artistic facade by Ridhima singh, Danza del design

According to Chandra, safety concerns related to cladding materials primarily revolve around fire safety, structural integrity, and health hazards. Addressing safety concerns concerning cladding materials requires careful selection, proper design, quality installation, ongoing maintenance, and adherence to regulatory requirements. Collaboration among architects, engineers, contractors, and building owners is essential to mitigate risks and ensure the safety and integrity of building façades.

A project by SSB Architects

Innovative retail facade design by SSB Architects

Typically, cladding materials:

1. should be assessed for their fire resistance & ability to prevent the spread of fire;
2. must be designed & installed to withstand various loads, including wind, snow, seismic forces, and impact; and,
3. materials which may release harmful substances or volatile organic compounds (VOCs) into the indoor environment, posing health risks to occupants, should be avoided or properly managed to mitigate health hazards.


RIDHIMA SINGH
Founder and Creative Director, Danza Del Design

Talking about Fire safety standards **Ridhima Singh, Founder and Creative Director, Danza Del Design** points out that fire safety standards for cladding materials are essential to protect the building and its occupants from the spread of fire. Materials with high fire resistance, such as ceramic tiles and stone cladding, are preferred for their ability to withstand flames and prevent fire spread. Other safety concerns include the structural integrity of the cladding system, its resistance to impact and wind loads, and its vulnerability to water ingress or corrosion, all of which can compromise the safety and security of the building. In the future, we strongly expect the use of biodegradable and recyclable cladding materials such as bio-based polymers and mycelium composites, offering sustainable alternatives to traditional materials. Innovative designs incorporating kinetic façades and responsive cladding systems will enhance the interactive and adaptive capabilities of buildings, responding dynamically to changing environmental conditions and user needs.

FUTURE CLADDING MATERIALS

The future of cladding is intelligent and adaptive. Imagine self-healing materials that automatically repair minor cracks or cladding systems that dynamically adjust their properties throughout the day to optimise natural light and ventilation. Furthermore, points Ar. Kapila, the integration of sensors and actuators within cladding systems for remote monitoring and performance optimisation is a concept with immense potential. This would allow for real-time adjustments to the building's envelope, further enhancing comfort, sustainability, and overall building performance.

"In the next 25 years, I hope to see a shift towards more sustainable cladding materials like recycled options and composite stones made from construction waste. Incorporating solar energy generation into cladding systems for electricity would be fantastic. And I'm excited about technological advancements which could revolutionise how buildings function, like cladding materials utilising solar energy and not only storing electricity", Ar. Sharma is hopeful.

According to Chandra, predicting specific types of cladding materials and designs in the future is challenging. However, some potential types of cladding materials and designs to look out for are smart materials, carbon-neutral materials, 3D printed materials, nanoengineered materials with enhanced properties, transparent solar panels and the use of bio materials and bio-fabrication.

While these speculative trends offer insights into potential future directions for cladding materials and designs, it's important to recognise that technological, economic, and cultural factors will ultimately shape the trajectory of innovation in the built environment over the next 25 years.

"The Integration of Smart Technologies within Cladding Systems Could Become More Prevalent"


VARUN PODDAR
Founder, VOX India

What are the innovative materials for exterior cladding and those in maximum demand?

Fiber Cement: Made from a blend of cement, sand, and cellulose fibers, fiber cement is durable, fire-resistant, and available in various textures and colours. It's a favored option for contemporary cladding projects.

High-Pressure Laminate (HPL): HPL panels consist of multiple layers of kraft paper infused with phenolic resin and topped with a decorative layer. They provide excellent weather resistance, colour fastness, and design versatility, suitable for diverse architectural styles.

Natural Stone Veneer: Thin-cut natural stone veneers mimic traditional stone cladding but with reduced weight and easier installation. They come in various stone types, textures, and colours, adding a luxurious and timeless touch to buildings.

Polymer Panels: Polymer façade cladding material made of polymer, offering durability, weather resistance, and a range of design options. It's lighter, easier to install, and requires less maintenance compared to traditional materials like brick or concrete. They can replicate the look of natural wood and are available in various wooden finish colours. It's resistant to moisture, rotting, and insect damage, making it ideal for exterior use in diverse climates.

Metal Panels: Aluminum, steel, and zinc panels are popular for exterior cladding due to their lightweight nature, durability, and modern aesthetic appeal. They can be customised into different shapes and finishes.

These materials cater to varying preferences, project needs, and environmental concerns, driving a shift towards eco-friendly options that offer both performance and aesthetics.

How does façade cladding help in creating energy-efficient and cost-effective buildings? What are the effects of cladding materials on acoustics, daylighting, heat ingress, and energy conservation?

Acoustics: Cladding materials can contribute to sound insulation and absorption, affecting the overall acoustic performance of a building. High-quality cladding materials with good sound insulation properties can help reduce external noise and improve indoor acoustics, creating a more comfortable environment.

Daylighting: Cladding materials can influence the amount of natural light entering a building, which impacts daylighting. Some materials may have properties that allow for better light diffusion or reflection, leading to improved natural lighting conditions indoors. This can reduce the need for artificial lighting during the day, thereby saving energy and costs.

Heat Ingress: The thermal properties of cladding materials play a significant role in managing heat ingress into buildings. Insulated cladding systems can help in

reducing heat transfer through walls, thus contributing to energy efficiency by minimising the need for excessive heating or cooling. This leads to lower energy consumption and cost savings over time. Energy Conservation: Energy-efficient cladding materials contribute to overall energy conservation in buildings. By providing thermal insulation, reducing heat loss or gain, and optimising natural lighting, these materials help create a more sustainable and environmentally friendly building envelope. This, in turn, can lead to reduced energy bills and operational costs.

What are the cladding trends considering materials?

Sustainable Materials: There's a growing preference for sustainable cladding materials such as recycled wood, reclaimed brick, natural stone, and eco-friendly composites.

Metal Cladding: Aluminum and steel cladding remain popular due to their durability, lightweight nature, and ability to create sleek modern designs.

Fibre Cement: This material is gaining popularity for its fire resistance, low maintenance, and ability to mimic the look of wood or stone.

Colours:

Uni Colours: White, Brown, Graphite, Black
Nature Colours: Honey oak, Ash, Beech, Walnut, Golden oak, Oak, Winchester oak.

Designs:

Minimalist Designs: horizontal and vertical designs, especially in modern and contemporary architecture.

Textured Finishes: Cladding with textured finishes like wooden finish, depth, and visual appeal.

6. Please tell us about the fire safety standards of Cladding materials. What are the other concerns considering the safety and security of the building with respect to the cladding materials?

Ensuring fire safety standards in cladding materials is crucial to protect buildings and their occupants from the rapid spread of fires. Cladding materials are rigorously tested for their fire resistance, which measures how long they can withstand fire exposure without compromising their structure or contributing to fire propagation.

Apart from fire resistance, the production of smoke and toxic gases during a fire is also a significant concern. Cladding materials are assessed for their smoke generation and toxicity levels to minimize risks to occupants.

However, fire safety is just one aspect to consider when it comes to the safety and security of buildings concerning cladding materials. Other important considerations include weather resistance, durability, and maintenance. Cladding materials should be able to withstand various weather conditions and require minimal upkeep for long-term functionality.

Aesthetic and design considerations are also essential as cladding materials contribute significantly to a building's visual appeal and should align with its overall design aesthetics. Additionally, thermal performance is crucial. Cladding systems not only enhance fire safety but also protect the interior from heat loss and promote good air circulation to prevent mold growth.

Moreover, sustainability plays a vital role in choosing cladding materials. Opting for environmentally friendly options that minimise the use of natural resources, do not require painting or extensive maintenance, and are recyclable can significantly reduce a building's ecological footprint.

What are the types of cladding materials and designs you wish to see/use in future, say 25 years from now?

The integration of smart technologies within cladding systems could become more prevalent. This might include self-cleaning surfaces, energy-generating materials (such as photovoltaic cladding), or even interactive cladding panels that respond to environmental conditions.

Cladding systems capable of adapting to changing weather conditions or user preferences may become more popular. This could involve adjustable panels for shading or insulation, dynamic colour-changing surfaces, or modular designs that allow for easy reconfiguration.

Furthermore, cladding systems capable of autonomously regulating temperature, humidity, or air quality within buildings could be developed, contributing to improved indoor comfort and energy efficiency.

Additionally, cladding materials or surfaces that integrate augmented reality (AR) features for informational or interactive purposes could be explored, offering new possibilities for user engagement and building functionality.

India's Exterior Wall Cladding Market Booming: Driven by Aesthetics, Efficiency and Sustainability

SUMIT GUPTA
Managing Director,
Alstone Manufacturing Pvt. Ltd.

Tell us about the market for exterior cladding materials in India.

The market for exterior cladding materials in India has experienced significant growth on the back of the increasing focus on aesthetics and energy efficiency during building construction. Fast growing demand for innovative and sustainable cladding solutions is also driving market growth.

What's the present valuation of the exterior wall cladding/covering material market in India?

The market size for exterior wall cladding/covering materials in India is significant and is expected to grow steadily in the coming years, due to the rising demand for high-quality cladding materials in both residential and commercial construction projects.

Alstone Antiq

What's the future outlook for the market for exterior wall cladding materials?

With the growing construction industry and increasing awareness about the benefits of exterior cladding, the future outlook for exterior wall cladding materials in India is highly positive. The market is expected to witness steady growth driven by factors like growing urbanisation, infrastructure development, and the emphasis on green building practices.

What's the growth rate anticipated in the industry for the exterior wall cladding materials?

The growth rate of exterior wall cladding materials is anticipated to be around 5.1% CAGR to reach $168.12 (Source Google) billion globally by 2032. Rising construction activities and increased adoption of advanced cladding materials have fuelled this high demand.

Alstone Stonera

What are the factors driving the demand for exterior wall cladding?

The factors driving the demand for exterior wall cladding include the fast-emerging need for energy-efficient building solutions, increasing urbanization, and the focus on sustainable construction practices. Additionally, the low maintenance, and aesthetic appeal of exterior cladding materials, besides their durability, is equally contributing to the growing popularity of exterior wall cladding in the market.

As a brand, Alstone offers a wide range of series that are not only aesthetically beautiful but also have a long life. It encompasses a variety of range, including Alstone HPL, Alstone Stonera, Alstone Antiq, Alstone Louvers, Alstone Zinc and Alstone Alcomb. Alstone is the ultimate choice for elegant and durable cladding solutions.

Alstone HPL

Alstone Alcomb

Choose the Right Exterior Cladding Materials for Interior Comfort & Sustainability

IMAGE CREDIT: PENTASPACE DESIGN STUDIO

Exterior cladding is the first point of contact and the first protection layer between the external environment and the indoors. Therefore, it plays a very crucial role. Exterior cladding materials are vital in determining interior comfort and sustainability by influencing insulation, air quality, and energy efficiency. Cladding serves as the protective skin of a building, bolstering its overall performance and resilience. Acting as a shield against weather elements, cladding enhances structural integrity and offers insulation, moderating interior temperatures and ensuring moisture control.

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RACHNA AGARWAL
Founder and Design Ideator,
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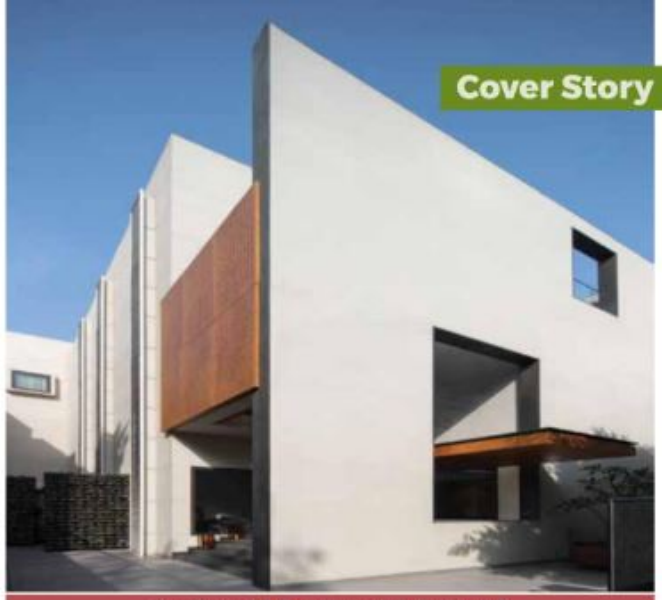
SMITA TIWARI
Co-Founder,
Articlad



The concrete and tile material palette (Studio IAAD)

Exterior cladding provides thermal insulation by reducing energy consumption for heating and cooling, says **Ar. Gaurav Sanghavi, Co-founder, Pentaspace Design Studio**. Additionally, they protect against environmental factors like rain, wind, and sunlight, preventing water penetration and maintaining a healthy indoor environment. Some materials optimise natural daylighting and manage solar heat gain, reducing the use of artificial lighting. Cladding also contributes to acoustic insulation, enhancing occupant comfort. Sustainable options, sourced from renewable or recycled materials, reduce environmental impact. Their durability and low maintenance extend the building's lifespan, promoting sustainability. Careful selection of cladding materials is crucial for occupant comfort and sustainable building practices, aligning with environmental and economic objectives for a project.

The amount of solar radiation the exterior wall absorbs or reflects defines the interior comfort, describes **Ar. Nilesh Gandhi, Principal Architect, Meta Design.** The Solar Reflective Index (SRI) values, are important to ensure reflection and not absorption and reduce heat transfer by conduction to the inside. Gandi too agrees that like most other materials, the recycled content in manufacturing the exterior cladding materials will be an additional benefit to define the building's sustainability.

Regarding cladding materials, **Rachna Agarwal, Founder and Design Ideator, Studio IAAD** notes that materials like high-performance windows and insulated cladding systems contribute to better thermal regulation, reducing energy consumption for heating and cooling. Additionally, selecting low-VOC materials improves indoor air quality. Agarwal also talks about sustainable cladding options, such as recycled or renewable materials.

In terms of sustainability, cladding emerges as a superior choice, necessitating minimal maintenance and thereby reducing the environmental footprint associated with building upkeep. Moreover, the availability of eco-friendly materials further augments the building's sustainability quotient by curbing its carbon footprint, points out **Smita Tiwari, Co-Founder, Articlad.**

An urban residential project by Meta Design

INNOVATIVE MATERIALS IN VOGUE – SUSTAINABLE, AESTHETIC & VERSATILE

ACP is the most common and publicly used, though high-pressure laminated boards, brick cladding tiles and stones are some of the materials in vogue, says Ar. Gandhi. Agarwal vouches on prefabricated fibre cement panels, composite wood cladding, and 3D-printed façade elements. "These materials offer versatility, durability, and aesthetic appeal, meeting the demands of modern architecture. Additionally, materials like ceramic cladding and aluminium composite panels are in high demand due to their sustainable properties and design flexibility", she adds.

Explaining the diverse benefits of cladding materials, Tiwari doted on ventilated façade cladding systems that facilitate free airflow, offering great insulation. There are so many products which can be used to create a ventilated façade including natural stone. Another ground-breaking invention is cladding products crafted from low-carbon or carbon-free concrete, which reduces environmental impact significantly, adds Tiwari.

Indian buyers, known for seeking innovation alongside affordability, find flexible cladding to be the optimal choice. Crafted from unfired clay and just 3-4mm thick, modified clay materials (MCM) wet cladding reduces costs and minimises detachment risks. What sets it apart is its exceptional environmental credentials, perfectly attuned to sustainability objectives which even motivates designers to come up with complex architectural structures which is no longer difficult to clad. Edescribes Tiwari. MCM Unfired Clay Cladding is a clay-based natural tile, which is crafted by amalgamating unfired clay and specialised polymers.

Emerging exterior cladding materials address sustainability, durability, and aesthetics. Fibre-reinforced polymer (FRP) composites offer strength, weather resistance, and design flexibility, mimicking natural materials. Notes Ar. Sanghavi. Cladding material made from renewable sources like bamboo, reduces environmental impact. Metal cladding systems like aluminium and zinc are popular for durability and modern appeal. Engineered wood products are valued for sustainability and warmth. Translucent materials such as polycarbonate sheets transmit natural light and create dynamic structures. Selection of cladding materials is based on sustainability, durability, aesthetics and architectural and environmental needs.

INDOOR COMFORT WITH EFFECTIVE CLADDING

Façade cladding enhances energy efficiency and cost-effectiveness by providing insulation, reducing heat ingress, and optimising daylighting. High-performance cladding materials contribute to thermos-regulation, minimising energy consumption for heating and cooling. Additionally, materials with acoustic properties can attenuate noise transmission, improving indoor comfort. Properly designed cladding systems maximise natural daylight penetration while minimising glare, reducing the need for artificial lighting and lowering energy costs, notes Agarwal.

While energy-efficient cladding products may not immediately strike you as cost-effective, adds Tiwari, delving into their life cycle costs unveils a fascinating truth: you could be spending up to 20 times less over the product's lifetime.

Depending on the climatic zone of the building, the cladding plays the role of protection by creating a shell, which

3D Designs by Studio Pentaspace

A project by Meta Design

makes the building energy efficient or energy deficient, restates Gandhi. The materials with a higher sound absorption will help in acoustics. Cladding materials, if opaque, will have no control over the daylight entering the building, but if we consider glass as a cladding material to a building, without a backing, the Visual Transmittance (VT), and Solar Heat Gain Coefficient (SHGC) will define the light and heat ingress impacting the energy consumption.

Some cladding materials even enhance natural light penetration, reducing reliance on artificial lighting. Additionally, innovative concepts like façade lights powered by solar energy further reduce the need for lighting in the evening. Many cladding materials also possess sound-absorbing and reflective properties. Ultimately, the choice of cladding depends on various factors. However, any cladding option can result in long-term savings and a positive environmental impact.

According to Ar. Sanghavi, high-quality materials help maintain consistent indoor temperatures, reduce energy consumption, and lower operational costs. They act as a protective barrier against weather conditions, maintain a comfortable indoor environment and minimise maintenance expenses.

An institutional building with interesting façade (Studio IAAD)

Overall, thoughtful selection and implementation of cladding materials significantly enhance building performance and sustainability while improving occupant's comfort.

CLADDING TRENDS

According to Ar. Gandhi, it is more sustainable to have the principal building envelope material sustainable and in line with the overall project requirements. However cladding materials are preferred on account of aesthetics, speed of construction, décor and theme of a project. Wood, for example, provides warmth, but natural wood structures are not condusive to our environment hence cladding with a wooden finish is in trend. Manufactured cladding materials provide all kinds of colours, shades, designs and patterns, so have become a product of choice of several designers.

Aggarwal says that popular materials include timber, metal and composite panels, offering a range of textures and finishes. Neutral tones like greys and earthy hues dominate colour palettes, complementing modern design schemes. Architectural trends favour clean lines, geometric patterns, and minimalist designs, emphasising simplicity and sophistication.

CURRENT TRENDS IN CLADDING

Current trends in cladding emphasise dynamic patterns and captivating façades, extending beyond materials to include structural shapes. Globally, there's a surge of innovative approaches such as utilising three-dimensional patterns and textures to create visually stunning façades that add depth and dimension to buildings.

Façade Light Play: Incorporating lighting elements into the façade design to create dynamic effects, patterns, and visual interest, especially during the evening hours.

Parametric Façade: Employing parametric design principles to create façades with intricate and customisable patterns, shapes, and geometries that respond to various environmental factors and design criteria.

Graphic Concrete: Graphic concrete is a revolutionary technology that allows intricate patterns, images, or graphics to be imprinted directly onto concrete surfaces.

Graphic concrete offers architects and designers a versatile and customisable way to add visual interest and artistic flair to building exteriors, façades, walls, and other concrete elements. The patterns and images can range from simple geometric designs to intricate illustrations or photographs, depending on the desired effects.

One of the key benefits of graphic concrete is its durability and longevity.

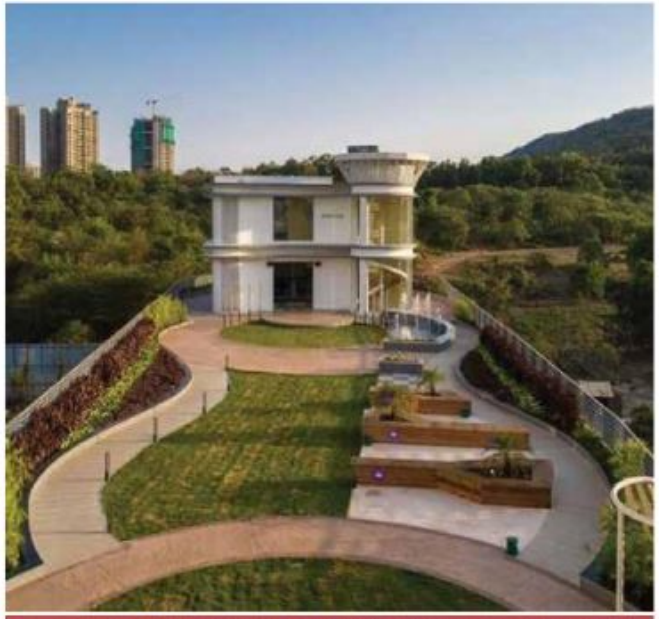
(Smita Tiwari, Co-Founder, Articlad)

CLADDING PREFERENCES BASED ON END-USE

In the dynamic realm of architecture and construction, cladding trends evolve in response to the diverse needs and priorities of various building sectors. From residential to industrial settings, each end-use category presents unique opportunities for innovation and creativity in cladding design.

In residential buildings, there's a growing preference for natural materials and an increasing use of modular green façades. Residential projects often embrace natural materials like wood and stone for a warm, inviting ambience, says Aggarwal. According to Ar. Sanghavi, homeowners increasingly favour engineered wood products and fibre cement panels, for their natural appearance and low maintenance. Sustainable options such as reclaimed wood or recycled metal are also gaining popularity.

For commercial, institutional, healthcare or office developments, aluminium



Surroundings play a great role in choice of cladding. Image courtesy, Meta Design

Facade design by Pentaspace Design Studio

composite panel (ACP) has the major market share, on account of cost and time efficiency. In commercial and institutional buildings, says Aggarwal, sleek metal cladding and glass curtain walls create a modern, professional appearance. In commercial and office buildings, there is a noticeable shift towards 3D patterns and parametric designs, adds Tiwari.

Institutional buildings prioritise durability, functionality and most importantly safety. So products such as flexible clay cladding become the best choice. Institutions like schools and government buildings prioritise cost-effectiveness and durability. Fibre cement panels and brick veneers are popular choices for their affordability and longevity. Sustainable materials such as bamboo or recycled glass may also be incorporated, notes Ar. Sanghavi.

Industrial projects with a major focus on internal manufacturing, or performance criteria, have a lesser focus on external aesthetics, hence not a major focus on cladding material per se, says Ar. Gandhi. Industrial buildings require materials that can withstand harsh environments. They should focus on functionality and cost-efficiency, utilising durable materials like concrete and metal panels. Corrugated metal panels and insulated metal panels provide durability and energy efficiency, while precast concrete panels offer strength and fire resistance.

Healthcare facilities prioritise hygiene and durability, opting for easy-to-clean and antimicrobial materials. In healthcare facilities, modular options are common, and innovative products like healing stones are emerging. Non-porous materials like stainless steel and glazed ceramic tiles are preferred in hospitals for their resistance to moisture and bacteria. Natural wood or green walls are also being used to promote well-being.

Offices aim for a modern appearance and functionality. Glass curtain walls are common in offices for maximising natural light and creating visual impact. Glass façades maximise natural light, while metal composite panels and high-pressure laminate cladding offer sleek aesthetics and easy maintenance. Office spaces emphasise flexibility and sustainability, incorporating adaptable cladding systems and green building materials.

FIRE SAFETY STANDARDS OF CLADDING MATERIALS

Fire safety standards for cladding materials involve compliance with building codes and regulations, ensuring materials meet flame spread and smoke toxicity requirements. Concerns regarding safety and security include resistance to weathering, impact resistance, and resistance to vandalism or intrusions, explains Aggarwal. Additionally, proper installation and maintenance practices are essential to mitigate risks associated with cladding, such as water infiltration or structural instability.

3D Designs by Studio Pentaspace

MATERIALS, COLOURS, DESIGNS

Materials: Sustainable and innovative materials are gaining popularity, including engineered wood products like cross-laminated timber (CLT), fibre-reinforced polymers (FRP) and bio-based materials such as bamboo or reclaimed wood. Metal cladding, particularly aluminium and zinc, remains popular for its durability and modern appeal. Additionally, translucent materials like polycarbonate sheets are increasingly used for their ability to transmit natural light.

Colours: Neutral and earthy tones continue to dominate, reflecting a preference for timeless and natural aesthetics. However, there is also a growing interest in bold and vibrant colours, as well as metallic finishes, adding visual interest and personality to building façades.

Designs: Contemporary designs often feature clean lines and minimalist aesthetics, with an emphasis on simplicity and functionality. However, there is also a revival of interest in textured surfaces, geometric patterns, and intricate detailing, adding depth and visual intrigue to cladding systems. Modular and prefabricated cladding solutions are gaining traction for their efficiency and ease of installation, allowing for greater design flexibility and customisation.

(Ar. Gaurav Sanghavi, Co-founder, Pentaspace Design Studio)

Fire safety standards for cladding materials are vital to prevent fire spread, focusing on fire resistance, combustibility, and smoke production, adds Ar. Sanghavi. Materials must meet specific fire classification ratings. This includes assessing their resistance to fire, how easily they burn, and the smoke they produce. We also need to make sure they don't catch fire easily, and that any smoke they produce isn't harmful. It's important to choose materials that can withstand weather to stop water from getting in, maintain a building's structure, and protect people from falling debris during emergencies. Taking care of these things keeps buildings safe and protects the people inside.

Fire safety will depend on the base on which the cladding material is installed, says Ar. Gandhi. If the base material is non-combustible like a concrete or a brick wall, then the fire standards of the external cladding material will matter less. From a longevity perspective, the adhesion of the cladding material with the base envelope becomes critical, as well as the life and LCA of the materials.

WHAT LIES AHEAD

Future cladding materials and designs should emphasise sustainability, resilience, and innovation. Materials which are easy and quick to install, modular to adapt to the existing envelope in case of retrofits, and ones which are 100% recycled would be game changers for the real estate industry.

Bio-based materials, such as engineered timber and biopolymer composites, offer environmentally friendly alternatives to traditional cladding materials. Advanced technologies, like self-healing coatings and integrated photovoltaics, could enhance functionality and energy efficiency.

The striking Chambers building in Andheri, Mumbai by Pentaspace Design Studio

Design-wise, dynamic façades capable of adapting to environmental conditions and user preferences may become prevalent, blurring the boundaries between architecture and technology.

AI advancements will likely revolutionise the cladding industry, leading to smarter, more energy-efficient choices in the next 25 years.

Products based on nanotechnology will indeed play a significant role, offering self-maintaining properties and the ability to adapt over time by changing colour, texture, and more, creating dynamic architectural expression. Translucent solar cladding also appears to be a promising future trend, harnessing renewable energy while allowing natural light to penetrate indoor spaces, blending functionality with aesthetic appeal.

Furthermore, with a more sensitive approach to sustainability, carbon-capturing buildings will likely become more prevalent, actively reducing carbon emissions and mitigating climate change. This could include the widespread use of innovative materials like carbon-negative concrete, self-healing bioplastics, or nanomaterials with enhanced thermal properties.

Innovative cladding by Articlad

In order to reduce the heat gain, the west side has been blocked with a solid mass. Vertical strip windows were introduced on the west façade (Studio IAAD)

Also, buildings might have smart cladding with sensors that monitor things and adjust as needed. We might also see more nature-inspired designs like living walls or green façades, which make people feel good and help the environment.

Plus, using prefab cladding material could make building faster and let architects be more creative. The designs should strive to harmonise with their surroundings, contribute to energy efficiency, and enhance the overall quality of built environments.

Overall, the future of cladding holds exciting possibilities, where innovative technologies and sustainable practices converge to create buildings that are not only beautiful and functional but also environmentally conscious and responsive to their surroundings. The future cladding solutions aim to balance aesthetics, performance, and sustainability in response to evolving architectural and societal needs.

The concrete and tile material palette effectively discourages the build-up of moss on the walls of the structure, thereby enabling minimal maintenance (Studio IAAD)