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Carbon Craft

Expert Opinion

Jagan Venkataramanan, Konnect AEC

Trupti Doshi, Auroma Architecture

Project Features

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Organic India

biltrax media

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“Sustainability, a key concern of our times, is also essentially linked to time, as it focuses on meeting the needs of the present without compromising the ability of future generations to meet their needs. It is not only about what materials and technologies are involved in the construction of architecture, but also about the validity and relevance of contemporary ideas over time.”

- Anupama Kundoo

From the Editor's Desk

Dear Readers,

Climate change is a reality that we cannot in good conscience ignore. It is here and it is here to stay. With the ongoing global pandemic - COVID 19, a significant majority of white collar jobs have transitioned completely to either work from home or have adopted a hybrid model of working. This in turn has led to a higher demand for certain typologies of construction that include residential development with a dedicated space for a home office, medical infrastructure, and data centres while reducing demands for certain other typologies such as office complexes and office campuses.

Globally, the construction industry up until very recently has been a big contributor to unsustainable development, and in India too, the construction industry has played a significant role in environmental pollution and adopting unsustainable construction methodologies as the country transitions from 'developing to developed' as a part of nation building. But things as we know it, and industry practices as we've seen so far, are changing. Both design and construction professionals as well as building material manufacturers are acknowledging this need for change, and evolving and adopting sustainable design practices and construction methodologies. With technological advances more and more people are using unconventional raw materials as a base for creating sustainable building materials.

It is with this in mind that we at Biltrax Media chose to feature prominent thought leaders, young professionals, sustainable design entrepreneurs and building material manufacturers that have actively and consciously focused on creating sustainable designs and products. We at Biltrax Media also aim to regularly cover details of the construction industry including – new trends in sustainable, climate sensitive architecture and materials, upcoming sustainable design projects, and the work that various organizations undertake in the industry. Ultimately, there's only one planet earth, and if we are not mindful of the resources we use, we may soon find ourselves in a situation where there may not be any resources remaining for the future generations! So here's to being more conscious of our surroundings, going green and being inspired by nature to create a more sustainable, environmentally conscious future for us and the generations to come!

NEHA TAMBE

Associate Editor at Biltrax Media

Head of Marketing, Communications and PR at Biltrax Construction Data

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Biltrax Media is owned & operated by Biltrax Construction Data. It chronicles architecture and construction with a focus on the role of data analytics, technology, engineering and government policies on design. It brings to the fore ideas and perspectives from a more rounded spectrum to delve deep into industries that play a huge role in the systems but are seldom spoken about in mainstream media.

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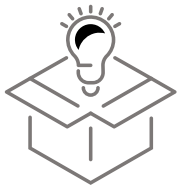

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PROJECT UPDATES
OCTOBER 2021

610+ Total Projects

220+ Million - Sq. ft.
Construction Area

57,400+ INR-Crore
Construction Value

PRIVATE SECTOR PROJECTS

410+ Projects

185+ Million-Sq.ft.
Construction Area

44,400+ INR-Crore
Construction Value

PUBLIC SECTOR PROJECTS

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41.5+ Million-Sq.ft.
Construction Area

13,00+ INR-Crore
Construction Value

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Auroma Architecture

Trupti Doshi

Creating stories, evolving traditions, and building green

By Shriya Goyal

Spaces are living entities, envisioned as an extension of nature and it's users. Intermingling stories within spaces, Auroma Architecture has been recognised among the Top 10 Eco-Architects of India. Co-founded by Trupti Doshi and Viral Doshi, this Auroville based firm is blending modern technology and ancient wisdom to create eco-friendly structures that are a delight for the user and sustainable for the planet. They have emerged as Asia's Top Finalist for the International Initiative to create "Houses of Tomorrow" by Lafarge Holcim. Trupti Doshi, an avid speaker for TEDx discusses the nuts and bolts of their practice, their design ideologies and the future research and initiatives undertaken.

Your practice is bridging gaps between humans and nature. Can you share the evolution of your practice? As a female in this male-oriented field of architecture, what were the challenges faced in your journey?

All of us can agree that we are happiest being closest to nature, whether it be on the bank of a lake, swimming in the river, climbing a mountain, or simply in a garden with flowers. The dichotomy of the situation is that the world wide average identifies that humans spend more than 80% of their life inside a building, be it a house, school or office. A cursory glance at our photos, apart from vacations, consist of a building in the backdrop. There is an inherent contradiction in the way that society has crafted lives and disconnected humans from nature. This was the reason I consciously chose to be a changemaker when I became an architect, instead of a mindless building churning bandwagon. "Buildings that make you happy" would be the tagline for my buildings.

I have worked in India, US, Europe, and many other countries across the world. Irrespective of the country, people everywhere respect and value competence, be it a client, a consultant or people on building sites. In that significance my gender has never stopped me from doing anything. I have achieved every possible accolade, not because of my gender, but because they understand my proficiency and respect it. Most often on building sites or in a boardroom, I am the only woman, since broadly the workers, consultants or big project clients are all men. This has never deterred me from being at my best, pursuing every milestone and solving every predicament.

The Auroma French Villaments is situated at the cusp of greenery incorporating a myriad of design elements. What were the challenges faced? Can you explain through an example, how do you go about creating spaces that tell stories?

I faced three challenges when designing Auroma french villaments – context, sustainability, and ease of maintenance. The site was close to Pondicherry, a city known for its french heritage and mediterranean style french villas. To bring out the context, my first choice was to design it in a style which respects the french heritage and at the same time utilises 21st century technologies to build energy efficient structures. The entire villament consists of 24 homes in phase-I and 12 homes in phase-II. To achieve heritage principles and replace 2ft thick walls for a thermal comfort, modern techniques amalgamated with thinner walls, lower cost and as a result increased sq.foot area was applied.

Making the design completely sustainable without adding extra cost was challenging. While developing a net-zero or energy efficient building a lot of factors need to be taken into consideration such as tanks for rainwater harvesting, panelling and circuit wiring for solar panels, use of climate responsive glass and paint, building orientation, wall window ratio and many more. The villament was designed by keeping all these in mind and yet maintaining cost as per normal construction. People generally avoid old style homes that are tedious to maintain, making easy maintenance an important design factor. I believe that we architects and builders are not here to just build, sell and get out. We must respect the sensitivity that the users are going to use the building for the rest of their life. Our design should fit into the context, energy efficient, easy maintenance and cost effective to give the owner a sense of pride for their house in your gated community.

It is easier to create a story through design when the story is embedded within a building. In one of my institutional projects 'Sharanam Cultural Centre', I excavated a portion of the earth, converted it into a pond for rainwater collection, manufactured bricks from the soil we excavated and constructed the whole 5 acre cultural complex from it and thus embedding the story within the building. This project has been featured by the United Nations as the model for sustainable development in India. I was invited across many European cities to present this cyclical and sustainable approach. The visitors are shown the pond and the building explaining how the earth became the building and the water that falls on it goes back into the earth in the form of a pond, completing the whole cycle.

> The buildings must be an expression and extension of the user, not the architect. That is what makes our projects distinct.

Auroma French Villaments in Auroville.

Villas situated at the cusp of greenery.


Sharanam Cultural Centre in Pondicherry.


Natural lighting in the centre through all sides.


Excavated portion of the earth for the pond.

Your designs highlight eco-friendly structures that complement the environment. Keeping a sustainable material palette, how are luxury-resorts, villas and residences made distinct? Can you elaborate on it through your projects?

First and foremost the scale is very different when it comes to residences as opposed to resorts or villas. For larger scale structures, a RCC cement concrete frame structure is preferable, but for ground or ground plus one storey buildings load bearing structures are used. In my understanding user centricity is essential. The buildings should not have my stamp as a creator but the user's stamp as the patron, since they will use it for the rest of their lives. Typically architects are known to be egoistic and want to make their presence known. As an artist we must have the humility of not marking our signature all over. The buildings must be an expression and extension of the user, not the architect. That is what makes our projects distinct.

For instance, the client in one of my ongoing projects is a photographer and the client's mother is a creative writer, so I want to bring out their personalities in the project. Whereas on another site my client is a builder and I am designing apartments to fulfill their requirement to sell fast, the building has to make money out of my design and the end user who buys the apartment has to be happy and proud that they got a majestic home. Hence buildings look distinct owing to scale, technology and making the building an expression of the user not the architect.

On one side we see a wave of sustainability, but the pandemic has given birth to numerous contactless technologies. What will the future foresee, combining both or going in a particular direction?

A coalition of both will be the onset of coming times. Since last year, a number of builders have reached out to me with a brief to design a green sustainable gated community. With the advent of technology, people now have the power to work over zoom and other online platforms, and at the same time live close to nature, away from polluted and crowded cities. I see a growth in sustainable designs and contactless technologies together hand in hand and at the same pace.

You mentioned having strong ties with the USA and Europe. How has this affiliation aided your design practice? In what ways can India achieve its mark to compete with international markets?

At the World Youth Congress in Washington DC, I was one of the three Indians chosen to represent India as a cultural ambassador. It was a stringent selection based on leadership qualities, and thousands of candidates were interviewed and shortlisted. Carrying the Indian flag and representing India in Washington DC was a moment of pride and honor. In the context of my knowledge and skills of classical music, sanskrit language, Indian classical dance and architectural photography in about 120 cities around the world, I could partake in the cultural exchange about my country and learn about American culture in return. My voyage to different cities greatly empowered my practice and me as a person. Meeting human beings around the world, learning life lessons and absorbing skills took my practice to the next level.

Architecture and users' take on buildings is distinct in India and abroad. In the USA the construction industry is standardised and in India it is highly customised. In the USA if your house looks very different from the neighbours, people won't buy it but in India if it doesn't look very different no one buys it. This is one of the reasons our talented Indian architects are not recognised globally, to suit an audience that appreciates customisation. Owing to this change in attitude we are not competing in the International market. With our creative advantage towards innovative thinking and realising design principles, we can compete with international markets if we have a certain theme standardised in our practice. I have visited at least 100 practices across the USA and Europe and I can see that my practice has a distinct creative advantage over them.

What are the future endeavours for Auroma Architecture in terms of design process,upcoming projects, research and initiatives taken?

In 2019, I represented India at the International Green Summit in Rome, where for the first time I presented a research on quantifying the effect of sustainable green buildings on human health and well being. So far this had been qualitative research that nobody had been able to quantify. This research shall soon be published by 'Springer', which publishes some of the world's best scientific journals and are held in the highest regard by the scientific community. This path-breaking research shall showcase the advantage of green buildings on human health. We are also designing apartments, resorts, bespoke villas and large scale institutional projects. In the coming year our office will be presenting a few exciting and path breaking projects.

Upcoming project - Jagriti Enterprise Centre in Purvanchal.


View of lily pond to reflect banyan tree's aerial roots.

Earthitects

Stone Lodges Private Residences

A Collectible that ages graciously

Experience 'Natural Living' at the Lap of Infinity.

A cozy nook allows you to stay and wander.

By Sakshi Agrawal

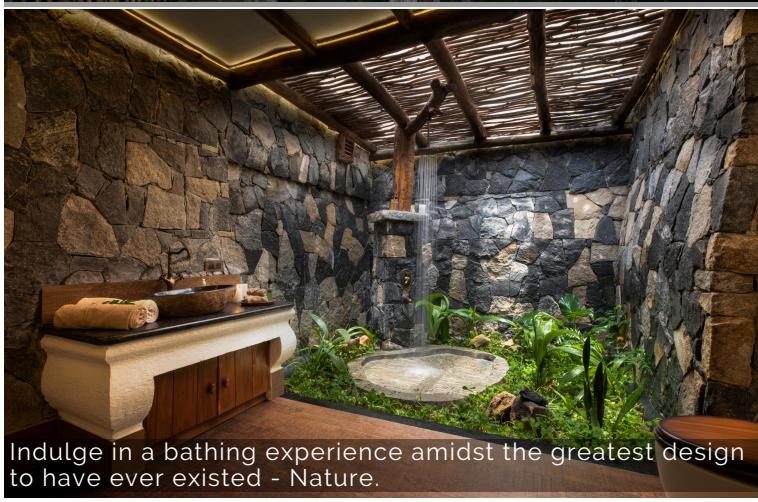
A home amidst nature is what we are meant to live in as people are burned out from their regular lives and require to shift to tranquil locations especially due to the current pandemic. Stone Lodges Private Residences designed by Earthitects brings in this new dimension to luxury with an essence of wilderness in every square foot. Built on sloping land on the side of a mountain, the built forms are inspired by the grammar of Mountain Lodges of Kerala and the native design aesthetic. George Ramapuram, the founder at Earthitects, has indulged in a joyous interplay of stone and wood where the villas are hidden amongst dense foliage and designed with unique elements, keeping sustainability and innovation in mind. Every bit is finely nuanced bespeaking a luxurious yet environmentally responsible aesthetic. Designs like Stone Lodges are changing the way people live.

With a philosophy to create 'around' nature rather than 'on' it, the team at Earthitects describe themselves as Architects of the Earth. Natural Life is about re-establishing the revealing experience of connecting with both oneself and the natural environment – a relationship that has been severed by our modern urban-centric lifestyles. "We re-imagined the experience of everyday living by allying with Mother Earth in designing and creating dwellings that are in harmony with oneself and the natural environment, dwellings that facilitate Natural Life," quote the architects. The luxury villas of Stone Lodges in Wayanad remain sun-kissed by the clouds. With sheer simplicity and understated elegance, each villa intertwines harmoniously with the mountain on three distinct levels and blends seamlessly into the natural landscape. Stone Lodges provides a 'Second Home' at the lap of nature to nurture hobbies like photography, organic farming, gardening, birding and trekking.

The materials used are natural including wooden flooring, random-rubble walls, cobblestone pathways, and log rafters. The wood used in crafting the space portrays its authenticity with 'Live Edges' that accentuate the natural character of wood. The floors, joinery, switchboards, skirting and furniture are handcrafted with live edge teak wood that adorns the spaces with warmth and grain. Rough, uncut and unpolished stone, each with a character of its own, forms the thick random rubble walls of the lodges. Other natural materials portrayed in Stone Lodges are the clay roof tiles, eucalyptus poles in the ceiling, and custom-finished granite to maintain its natural texture for counters and stone deck floors.

"The challenge of designing a dwelling on a natural slope was the difference in the contour levels and how we would turn this into our biggest opportunity. We overcame this challenge by designing the villa on three distinct levels. The first and second levels house the spacious residence. Nestled amongst the luxuriance of the wilderness, the third level comprises the Exterior Deck with an infinity pool surrounded by lily ponds. Due to the levels, each deck has an endless, unobstructed view of the forest." With endless views of the forest, the exterior deck is highlighted by stone flooring finished with black oxide. The railing made out of Eucalyptus poles creates the perfect viewing deck at the comfort of one's own home.


A space to ponder, surrounded by peace and serenity.


Indulge in a bathing experience amidst the greatest design to have ever existed - Nature.


Dine in harmony with nature.

Unwind and Relax under a Gazebo.

The abounding fullness and joy of Natural Life.

Day Lounger.

Surrounded by a tranquil lily pond adjoining the infinity pool, the outdoor dining space is designed such that one can dine under the soft glow of the twilight with an unobstructed view of the wilderness. Crafted from the finest teak, the dining chairs elevate the beauty of wood in its original form. Set amidst the lily pond and the infinity pool, the gazebo at Stone Lodges is crafted entirely out of natural materials. A thoughtfully designed roof made of unfinished log rafters and clay tiles is supported by four sturdy wooden poles thus creating the perfect viewing deck from the third level of the villa. Underneath the cozy 'gazebo' is a daybed to relax and unwind whilst listening to the songs of nature.

> With an uncompromising motive to maintain the ecological balance, we have created an environment where man and nature coexist with each other.

The signature Bay Windows at Stone Lodges, bring natural light into the space with a striking view of the lush landscape around. An addition to the expansive rooms, the exterior side of the bay window is covered with thick wooden poles inspired by the concept of mountain lodges. The unique 'Bridge' unfolds a journey that connects you to the greatest design that exists – Nature. The grandeur of the walkway is complemented by the high glass joinery all around. With light pouring across the entire stretch, the walk from one lodge to the next is an immersive experience with no visual barriers.

The lighting design is envisioned in such a way that it follows the architecture as you descend. Made out of granite, the steps are lit by automated lights providing a great user experience. A private retreat within the larger sanctuary, the master bedroom is an opulent ode to rest and relaxation. Designed to be one with nature, a private deck adjoining the space provides a stunning view of the surrounding wilderness. Portraying the natural edge, the exceptional wooden bed is the furniture of dreams! Sturdy and bold, this magnificent piece is crafted from robust teak wood. The hardwood floors made of rich teak, adorn the space with warmth and grain. The accent wall with rough-textured stone contrasts the warm wood all around.

"Our latest creation, among our signature outdoor baths, are envisioned to reveal the freedom of taking a shower beneath the open sky. This indulging tropical shower helps one reconnect with nature with the luxury of staying indoors." Set amidst a courtyard, the organic shower tray with stepping stones is surrounded by lush foliage and natural boulders. The interplay of light and shadow is brought about by the Eucalyptus poles on the ceiling, with their natural oils and distinct texture. Made out of brass, the bathroom fixtures add an antique charm to the rustic stone wall. Mounted on the counter, is a black granite wash basin elegantly chiseled from a natural rock. The wooden cabinetry below the counter is finished with hand-crafted wooden knobs that portray our close attention to detail. Encompassed by the serenading sounds of nature, the Harmony deck is the perfect place to dine under the twilight and the soft light of the candles.

Stone Lodges is spread across 15 acres of lush vegetation and grand contours. The architects mention, "Our Landscape design concepts implemented with sustainable measures encourage the protection of the native species of flora and fauna. With an uncompromising motive to maintain the ecological balance, we have created an environment where man and nature coexist with each other." The entire site has been afforested with over 8000 endemic species of trees making it a forested hillside today. Stone Lodges is now home to a variety of native birds, butterflies and other creatures. The integration of prolific fruit trees and birdbaths – the lily ponds, invite the birds to coexist, luxuriating the birding experience. The team at Earthitects take pride in their unique craftsmanship and detailing in design. They say, "Our skilled craftsmen – Our team of passionate Carpenters, pay close attention to detail, always looking forward to a challenge."

The biggest challenge was to retain the natural character of the topography and features of the site with no spatial re-tailoring. When a tree or boulder came in the way of the building, the plan was modified to go around the existing tree or rock and accommodate it to be a part of our natural design 'ensuring that no stone is turned'. The challenge of building on a natural slope was taken as an advantage by achieving the best views of the forest and the surrounding mountains from every space in the home. We believe that "The larger the challenge, the greater the opportunity". The challenge we faced gave us an opportunity to design dwellings with spectacular tree-top views from every space.

> Our skilled craftsmen – Our team of passionate Carpenters, pay close attention to detail, always looking forward to a challenge.

Bird-friendly landscape design.

Hand-crafted switchboard.

NITCO

Empowering the mason community with skill-led programmes

Philanthropic interventions that uplift communities, inspire action that goes beyond funding. NITCO, a leading interior and surface designing brand has taken initiatives at grassroots levels to foster progressive skills for the mason community. They have introduced a certified training programme under the name "Mason Tiling" that will develop skills, build livelihood and empower the mason community across the country. When such corporate companies go that extra mile to support growth infrastructure, the potential of economic revival takes a surge.

NITCO joined hands with Learnet Skills Limited, the largest vocational skills company in the country, to undertake a two-day workshop at Tonk, Rajasthan under the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) programme. This workshop aimed to build expertise and professional competency among the Mason community. The training aimed at enabling experienced masons to become trainers who can further conduct the "Mason Tiling" programme in Tonk. It was attended by 24 masons between the age group of 35 to 50 years, having an experience of over 15 years.

Initiatives to empower the Mason community.

NITCO experts trained the masons with deep insights about the basics of tiles, types of tiles, raw materials used in a tile, the tile manufacturing process, tile specifications and tile usage. On the second day of the training, the masons were practically trained through the actual process of laying tiles. Exercises where the masons themselves laid the tiles were also conducted in the open lab. Information combined with practical training benefitted the masons and empowered them to grow.

Vivek Talwar, MD, NITCO Ltd, said, "We are pleased to associate with Learnet Skills Limited under the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) programme. This training programme was very successful and well-received, as the masons, who are the key segment in building material work, benefitted from the knowledge shared by our experts from the basics of tiles to specification and usage of tiles.

We want more people to benefit from this and take advantage of such programmes to upgrade their skills. We endeavour to reach out to the larger community across India and build an army of well trained, professional and certified Masons. We will carry out more training programs in several parts of the country."

NITCO is a brand known for its range of world-class tiles. Such training programmes by NITCO which are scalable and have targeted initiatives surface their vision for the empowerment of building communities.

PKMVY Scheme.

Trainers programme.


Practical training experience and field training.

Certificate Programme under the name "Mason Tiling".

Footprints E.A.R.T.H

Ujasiyu

Innovative solutions to bring light and air in squatter settlements'


Ujasiyu - An affordable and local approach to sustainability.

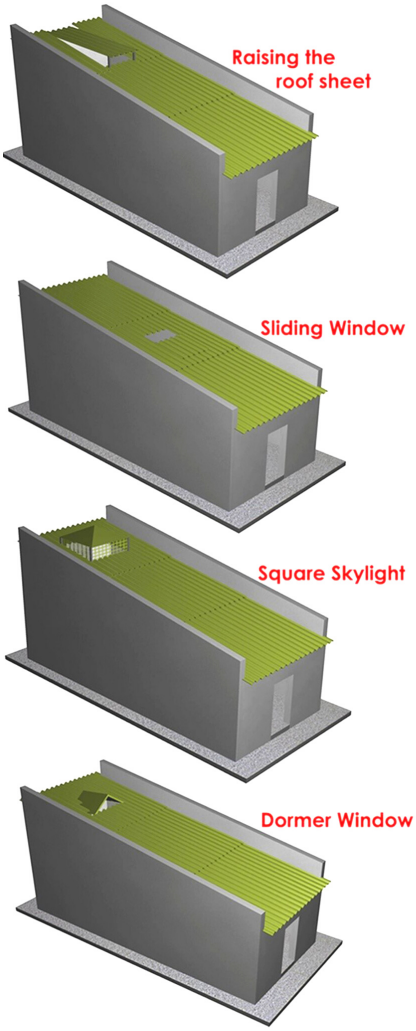
By Sakshi Agrawal

Inadequate housing infrastructure for the urban poor in Indian slums has long been an undealt meta-issue in our country. Owing to the paucity of land, squatter settlements emerge as deep long houses with more than three walls being shared, leaving no room for natural light and ventilation. The roofs of these houses are made of galvanised iron by default and convenience, making inner spaces even hotter. Artificial measures such as fans and lights would only spark unaffordable electric bills. Such drab and dark living conditions are detrimental to the physical and mental well-being of the residents. In wake of this, Mahila Housing Trust (Self Employed Women's Association) initiated 'Ujasiyu' in association with 'Footprints EARTH' that provides a simple, innovative and sustainable solution to this complicated menace.

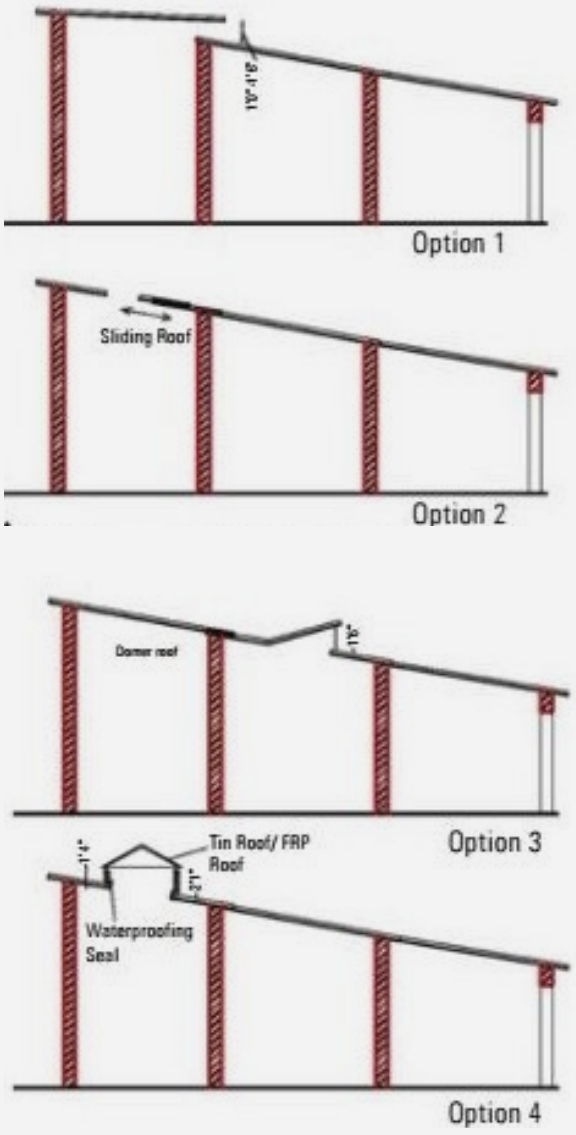
'Ujasiyu' is a simple dormer window that can be fitted to the roof allowing natural light and ventilation into the houses that are a part of informal settlements. This option led to a modular prototype worthy of mass off-site production as a cottage industry. The dormer window is made of fibre-glass moulded to fit on corrugated steel from which most existing houses are made of. The window shutter is made in translucent plastic which diffuses light and prevents glare. This illuminates the space instead of creating merely a light shaft. The plastic is moulded into a hump with an opening at the bottom to allow air to circulate, aiding in convective ventilation. The gap is covered with gauze to prevent insects from getting in.

The dormer window is made of fibre-glass moulded to fit on corrugated steel from which most existing houses are made of. The window shutter is made in translucent plastic which diffuses light and prevents glare.

These dormer windows were installed in over hundred homes in Ahmedabad industrial slums and the results were monitored over the year. Over the year these homes revealed savings of at least Rs. 250 on their electricity bills, an increased income of about Rs. 1500 through home based economic activities that were a result of long working hours, an improved educational quotient, reduced stress levels and therefore better health of the residents of these homes, and the a perception of an elevated social status owing to better daylighting and ventilation conditions.



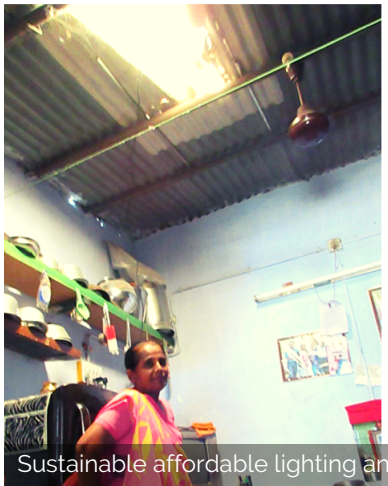
Design alternatives with Fiberglass.



Various applications of Ujasiyu

The solution is being transferred to slums in other states as well. These efforts were also recognised with United Nations Habitat Award citation. 'Ujasiyu' is a story that has come full circle after a series of research and experiments towards a green solution. Such initiatives lay out the true benefits of sustainability that extend beyond the environment to reap economic benefits and charter well-being.

> Ujasiyu has increased the income through home based economic activities due to long working hours, improved education quotient, reduced health stress and the perception of an elevated social status due to daylight and ventilation conditions.



Sustainable affordable lighting and natural ventilation,

Anupama Kundoo Architects

Anupama Kundoo

Trailblazing a holistic practice with material research and sustainable building methods

By Shriya Goyal

"Architecture is the stage on which all human stories are lived out", rightly stated by the Indian architect Anupama Kundoo. With her groundbreaking techniques to design buildings for every context, she began her journey in 1990, with a focus on building materiality to reduce their impact on the environment. Anupama has built an extensive career through collaboration and exploration of age-old, local materials and techniques. This article focuses on some of Anupama's renowned sustainable projects and how they engage with the user to foster intimacy, variety and sense of belonging.

Recent winner of this year's RIBA Charles Jencks Award, Indian Architect Anupama Kundoo's work centres around combining traditional craft techniques with knowledge-based scientific systems. The handmade materials featured in her projects are proven to be more favourable than mass produced construction methods. From Urban co-housing to shelter for homeless children to her own residence, Architect Anupama Kundoo's sustainable and socially conscious projects are low-cost and induce happiness in every context.

Volontariat Homes for Homeless Children

The residential domes clustered together are shelters for homeless children from challenged backgrounds. Managed and built for the Pondicherry-based NGO Volontariat, this project is a paradigm for low-cost and low-impact housing solution. These homes are planned to accommodate 15 children and 5 foster parents. Developed as a fire-established mud house, this building technology was pioneered by Ray Meeker of Golden Bridge Pottery, which consists of baking a mud house in situ, after constructing it. The structure is primarily a mud house built with mud bricks and mud mortar, and stuffed with other ceramic products as if it were a kiln and fired for three to four days to achieve the strength of brick.

This technology engages almost only labour, with minimal expenses of purchased materials, so the money enriches the local economy. The house thus becomes a producer of sustainable building materials instead of being a consumer. The structurally stable domes vary in sizes according to the cluster program. This prototype project is an exemplar of a revolutionary thinking, that is being explored to approach the problem of affordability of housing for all, and integrally sustainable in all its aspects.

The Wall House

Wall house, Architect Anupama Kundoo's own residence is situated outside Auroville and becomes a manifestation for her later work. The design of the house compactly accommodates everyday needs while effortlessly expands to absorb guests. Spatially, the house redefines boundaries and intermediary spaces in response to the climatic conditions and contemporary culture. It is a pinnacle of pervasive research and experimentation in low-impact building technologies that are environmentally and socio-economically beneficial. Negotiating a balance between hi-tech and low-tech and embracing conventional materials through techniques that integrate the participation of local craftsmen, the Wall House becomes the future of development.

Locally produced preindustrial achakal bricks and lime mortar became the material of choice for construction of the house. The Catenary vaulted roof was made using hollow clay tubes that served a dual purpose - climatic insulation and reduction in the reliance of steel as a material for pucca roofs The flat terraced roof was built using hollow burnt clay trapezoidal extruded modules over part pre-cast beams, manufactured locally for the purpose of finding insulated roofing solutions for flat roofs. Terracotta pots were used as fillers on intermediate floors to increase the effective depth of concrete while minimising the volume of concrete and steel.

The double height volume of the house enhances the air stack movement and increases the draft of natural ventilation. The focus on new ways of using age-old local materials that combine hand skills and local craft traditions in hybrid technologies became the base for Wall House and Anupama's future developments.

> The house redefines intermediary spaces in response to climatic conditions & contemporary culture.


Volontariat Homes for Homeless Children.


The domes are sustainable in all aspects.


Anupama's residence - 'The Wall House'


Catenary vaulted roof is used for climatic insulation.

Urban Eco-Community.

'Streets' on upper floors facilitate communication.

The project emphasizes on affordable and eco-logical living.

Urban Eco-Community

Modelled by the notion of Co-Housing, this housing project manifests a paradigm for low-density urban living with emphasis on affordability and positive environmental impact. A prototype for collective living, the design accommodates around 50-60 diverse residents with common facilities planned for the community. An assortment of apartment typologies for individuals, couples, families and youth groups are arranged around the central courtyard space. 'Streets' characterise a sense of community, hence streets (linear paths) are created on upper levels connected through an external stairway to facilitate communication. These walkways are detached from the facades to provide adequate privacy to the residents.

This ecological project is built using rammed earth walls having a large formwork, and fabricated using the excavated soil with 5% cement for water resistance. The trapezoidal terracotta roofing units laid on part-prefab beams were assembled as an easy modular construction of high insulation properties. A root-zone treatment plant recycles sewage water for irrigation. The construction techniques lend a contemporary character to materials associated with vernacular architecture. This commingling of various social and economic backgrounds integrated into a common cluster and built with environmentally friendly materials is a germane paragon for a sustainable community housing.

> Anupama's sustainable and socially conscious projects are low-cost and induce happiness in every context.

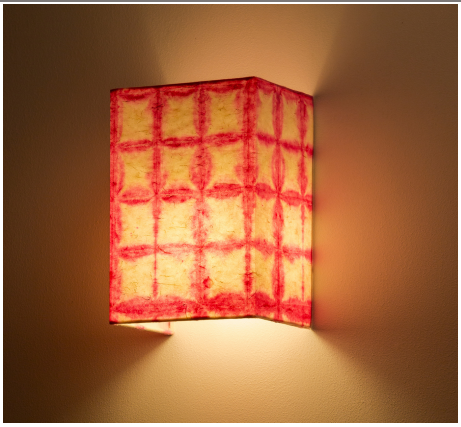
These thought-provoking projects by Anupama Kundoo are some of her acclaimed works that have gained appreciation all over the world. Combining modern materials with the skills of artisanal communities to meet climactic, ecological and socio-economic needs, she has completed each project with innovation to pave the way for future constructions.

OORJAA

Stylish, Modish and Vibrant, The Dori Collection adds a 'Green' punch to the festive season.

The new luxury paradigm in the 21st century, in a changing world, has shifted from being about the price to being about the process. The ultimate luxury is about the lightness of your footprint. The woman behind the first sustainable lighting studio in India, Jenny Pinto has been instrumental in bringing sustainability to the centre stage with her materials and design of lighting for homes, hospitality and corporate spaces. In 2015, Oorjaa was born, as a collaboration with The Purple Turtle.

Regarded as a pioneer in crafting lamps that exude charming and creative lighting design ethos, Oorja's veritable range of lamps and lighting fixtures are made of industrial and agricultural waste. Taking inspiration from nature, their latest collection is a resplendent example of how beautiful lamps can be sustainable and waste-free. From Brick Shibori Wall to the Coco Flower Pendant Lamp, each creation in the Dori collection is made in earthy and neutral tones with distinct floral patterns. These lamps with their simple and clean designs will add a minimalistic aura to your environment-friendly Diwali.



Carbon Craft Design

Tejas Sidnal

Addressing air pollution from an architectural perspective

By Sakshi Agrawal

At a time when the construction industry is held accountable for 39% of the global carbon emissions, blind depletion of resources is not just unsustainable, but absolutely irresponsible. Tejas Sidnal, the thought leader at Carbon Craft Design, has addressed this problem of waste carbon with an innovative product line where they manufacture upcycled carbon tiles to meet the world construction demands while mitigating air pollution at scale. Handmade by traditional craftsmen, each carbon tile by Carbon Craft Design prevents 30,000 litres of air from being polluted. That's one full day's worth of breathable air per person!

What led to the beginning of Carbon Craft Design? When did you decide you wanted to be a carbon entrepreneur and reverse global warming?

The idea of clean air, food, and water, and their relation to architecture has always interested me. During my post-graduation at the Architecture Association, we built a pavilion every year with the intersection of "Material Science - Biomimicry - Computational Design" as larger carbon negative research agendas. Following that, what petrified me was how architects become really responsible for 39% of the global energy-related carbon emissions owing to the construction and infrastructure industry. It all depends on how we, as architects, specify materials and how we decide to build. However, we don't really have materials that are carbon negative. So, looking at air-pollution, a global phenomenon made me think about how we can capture this carbon from the air or collect the waste carbon from the factories. Our journey started with brick in 2016, which we failed at because it did not hold any design value. No one wanted to pay for a material that could not be seen. In 2017, we introduced facades as they form the skin of the building. But, the commercial scalability of the façade was not economically viable because relatively very few projects really need an outer skin. In 2019, we arrived at tile, one basic building product, which is scalable and is also a design element.

My goals are inspired from biomimicry where in nature is my primary inspiration to design. There is nothing wasted in nature and one can always inculcate it back into the system. The idea is to create an ecosystem where material is expensive and shape is cheap.

What has been the research and design thinking so far in terms of treating carbon?

Air pollution poses two problems- one, how do you capture or collect carbon from different sources, and second, what do you do with it. Capturing carbon means taking waste carbon directly from the air and utilizing it before it is dumped into a water body or the soil. However, we have never had the technology and expertise to build a machine that could directly capture carbon. Also the quantity of carbon in the air is insufficient to scale it into a profitable business.

While exhaust emissions have been tightly regulated for many years, waste tyre management is completely unregulated and approximately 1.5 lakh tonnes of carbon waste is produced. This waste is burnt at cement kilns since there is no alternative-use case. This causes particulate matter air pollution. We identified this otherwise ignored burning of rCB (recovered carbon black) as a behemoth problem. The carbon we capture, collect and convert is PM 2.5, which is pollutant particulate matter. Initially, we worked with partners who would collect and capture carbon for us, and we would utilize it for our products. Later, when the pandemic struck, the operational supply chain was disrupted and eventually we started working with factories who reached out to us asking us to use their waste materials or primarily their waste solid carbon. People are cognizant of the problems related to carbon emissions but have no concrete solutions. All they do is either burn it or dump it. This paved a path, where we started collecting carbon from factories, preventing them from releasing their carbon waste into the air by burning it as a cheap fuel.

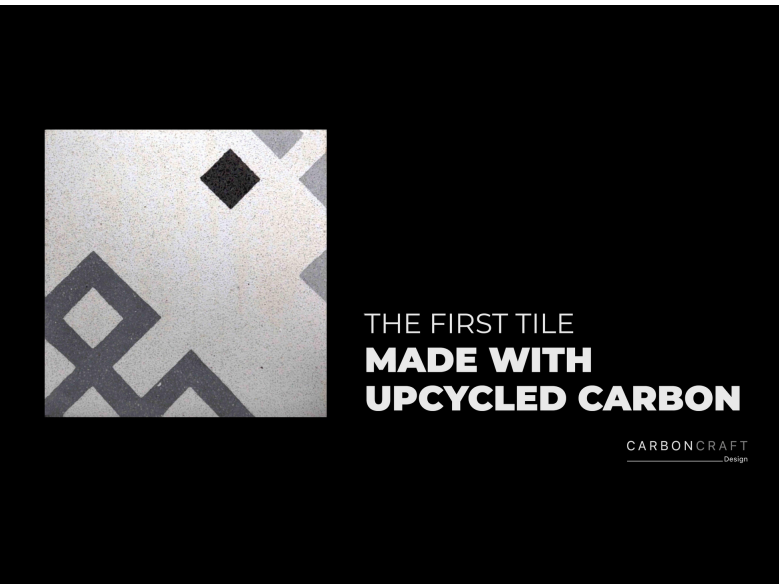
Once we started making tiles, the next big step was to discover the most carbon-neutral and energy intensive way of making a tile. We started to craft the tiles with a handcrafted technique where local craftsmen were employed. This consumed one-fifth of the energy as compared to any generic vitrified tile.

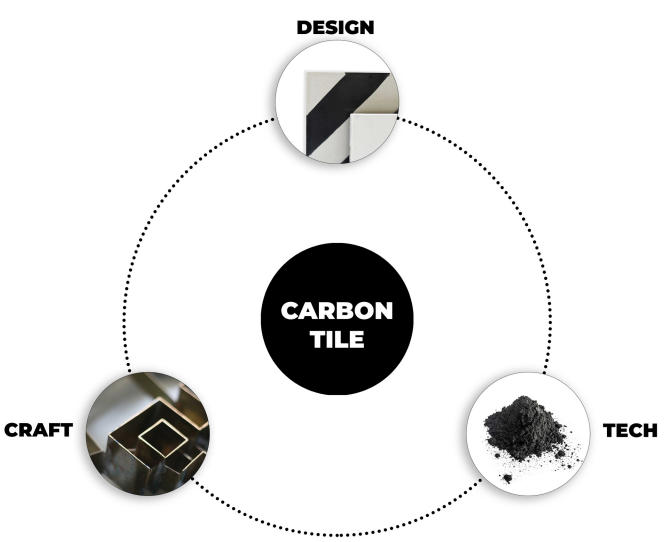
How do you capture carbon into a tile? Could you walk us through the process of manufacturing a carbon tile?

We have a three-stage process- collect, process and build. Collecting here means the carbon we collect from factories which undergoes a strict analysis where it is tested for usability and application. This collected and approved carbon is sent to our facility in Karnataka where it is processed. Processing involves standardising the carbon as per its application. This processed carbon is finally sent to Morbi, where the tiles are finally built. Morbi is the second largest producer of tile in the world, and here we work with the local artisans. This is our proprietary process which is geographically distributed because you can neither shift the artisans nor the factories. In the future, when demand is more, we hope to have a more centralised facility.

Iden Tile.

Carbon Tile.





The Carbon Tile Process.

Launching a new product that caters to the environment in an oversaturated market is a big challenge in itself. What were the initial hurdles and how did you overcome them?

After the pandemic hit the world, suddenly the whole world started shifting towards environmental products. So, COVID-19 in a way acted as a catalyst to Carbon Craft Design's products where end users understood the importance of carbon neutrality. That being said, the cash flow and economy has been highly disrupted. No one wants to pay a premium dime for something they can get for a lesser price. It is important to understand the scalable dimension that other industries have with their decades of operation and huge volumes of demand which in turn considerably reduces their costs. We are relatively new and don't keep inventory, which does affect our costs. But the traction has been good in an era like this where there are big brands coming who want to associate themselves with the environmental and sustainability aspect of design and construction.

To encourage people using these products, we have safety certifications in accordance with BIS. We also do mock ups and pilots for early adopters. We have been fortunate enough to work with a couple of architects who really encourage their clients to go carbon neutral. This in turn helps build our credibility in the market. It is important for architects and interior designers to advocate for carbon neutrality in order to achieve sustainable design. We don't know or care about the carbon footprints of any material as long as it is the right shade or finish or geometry. We really need to educate ourselves and in turn our clients about the impact of an increased carbon footprint from ground up.

> There is nothing wasted in nature and one can always inculcate it back into the system.

Could you tell us more about your existing products?

Our cities are filled with stories of cultural identities that were born from the core of humanity. Our standard range, known as IdenTile, is about touching that core again. These patterns are symbolic art forms of our contemporary taste with a modern twist for our living space. Our premium range, IndusTile talks about the relationship between mankind and material. Inspired by the magnitude of our consumption of natural resources, the design highlights the changes brought by the Anthropocene period. This series thus upcycles the maximum amount of particulate matter pollution.

What are your future trajectories and how do you envision Carbon Craft Design shaping in the near future? Can we expect more diversification in the product line?

Tile is just a starting point. We want to eventually try and make an entire building from upcycled carbon – furniture, artefacts, full range flooring solutions, bricks and everything that goes into making a carbon negative building. A lot of products are upcoming and are in research and development.

Lastly, what is the role of the construction fraternity in driving climate change?

Architects are the torchbearers in the construction industry that can lead the sustainable movement. We have to change the way we manufacture and use products. We need to realise that resources are finite and they need to be utilised to their core. The age-old Indian tradition of reusing and upcycling old things should be applied to the construction industry as well. I think what we also really need are carbon ratings for building materials. So, it shall be a no-brainer, when we get legitimate and verified scores for the materials we are using.

Application of a carbon tile.

Application of a carbon tile.

Tile manufacturing by artisans.

Design Forum International

Anand Sharma

Building nation with an ethos for context and sustainability

By Shriya Goyal

A witness to the unfolding construction journey of India, Design Forum International (DFI) has played a key role in 'Nation-Building'. This Delhi-based practice was founded by three graduates from the Indian Institute of Technology (Kharagpur), Anand Sharma, Anoj Tevatia and Goonmeet Singh Chauhan in 1995. With a wide range of portfolio, spread across 17 states, their designs emphasize the context and conservation of the built environment in thought and practice. Anand Sharma discusses the nitty-gritties of public infrastructure projects and the way forward post pandemic.

Who are the major stakeholders that drive the design and construction in National infrastructure projects? What are the philosophies integrated in public sector projects?

In terms of stakeholders, there are four pillars of a national infrastructure project.

1. End- Users
2. Entity undertaking Project Management
3. Architects and the Design team
4. Construction Agency that delivers the project

There are two kinds of infrastructural projects undertaken in the public sector.

1. Projects channelised by the government - where the public exchequer is the funding agency, and the end-user is a single entity. The design philosophy opted follows the intent of maximum rational use of money spent on the project.
2. Projects channelised by Public-Private Partnerships - where the exchequer is responsible for the revenue and money comes through a developer partaking the construction. This agency gets a share in the overall profit in lieu of bearing the cost of construction.

In partnership projects, the government accesses the monetisation value of the assets it is contributing to the development and encourages the partner to maximise the profit through the partnered venture. The design philosophies for such projects are carved on the profit generated.

> A climatically conscious client who involves in innovating environmentally responsive buildings is ideal for creating holistic architecture.

"Being an agent of change, your efforts are rooted in principles of sustainable architecture and response to the local context while ensuring that humans remain central to design." What role do clients play in sustainable architecture?

Every project undertaken by DFI finds its bearing in its climatic, socio-cultural and physical context, linked to a sustainable design venture. Sustainability usually pertains to water management and energy conservation in the conventional terms. At DFI, we believe that sustainability should also be extrapolated to the cultural context of the building. For instance, a public building in the north-east cannot function on natural materials like Dhaulpur and Agra Sandstone – the sustainable and aesthetically pleasing materials are not contextual.

The most feasible role of a client in designing a sustainable project is to give the architect the liberty to get creative and align with a design brief that promotes sustainability. A climatically conscious client who shows involvement in innovating environmentally responsive buildings is ideal for creating holistic architecture.

Gulf Adiba, Gurugram.

Environment friendly and climate responsive design.

How has the pandemic affected architecture, construction and the real estate industry? What are the design changes we should look forward to after the pandemic?

There are two evident segments of construction in real estate sectors – Living and Work spaces. The pandemic has blurred this differentiation and inspired people to conceive work-from-home as the new normal for the future of working population. This encouraged architects and designers to seek conscious solutions to equip inhabitants with more holistic living spaces, enhancing an individual's well-being and flexible workplaces to conjure a safe, productive and experiential journey. End users now confirm the relevance of multi-functional residentials with spaces that encourage a healthy work-life balance. In office typology, companies have switched from stand-alone offices to co-working - shared offices and the work from home facility. The workspace scenario has gone through a metamorphosis, wherein the trend has distinctly moved towards versatile and multi-user office spaces from individual tailor-made campuses.

The recent initiative where the public buildings were converted into healthcare facilities to fight the pandemic also signal towards adapting Disaster Preparedness as a standard feature for all large scale community buildings. Making these built volumes 'pandemic ready' in facilitating pluggability of medical infrastructure, sterile environment and flexibly convertible spaces activated in times of crisis like the ongoing pandemic is also a design change one should anticipate.

The Delhi High Court.

Grand steps at the entrance and waterscape in foreground.

The new block mimics the existing High Court.

Government building design like 'The Delhi High Court' do not provide a lot of design freedom. What are the complexities and design constraints for such rigid building types?

All government projects do not necessarily have rigid building constraints, but they comprise functionality as the fundamental design principle. There are 3 significant constraints to the design of a highly utilitarian project, such as The Delhi High Court.

1. The flow of users – litigants and legal fraternities like judges, is central to the design. The interlink between different courts, judicial chambers, facilities for lawyers and litigants is prominent for the project.
2. The other challenge to such a building is its location in the middle of Lutyens' Delhi, in the lap of historical classics all around. Providing justice to this surrounding fabric while confirming the suggestive building codes was a challenge in itself.
3. For a project like Delhi High Court possessing a stressful environment, creating a comforting user experience is another challenge. Natural light and indoor greens aids to the stressful mind frame of the one facing litigation.

> Learning lessons from the current crisis, the desire to connect with nature has never been more prominent. Interweaving breathable open spaces, natural ventilation and greenery as part of our indoor spaces and infrastructure in the public domain suggests the way forward in terms of design innovation.

Of all the work you do, which particular project has offered the most scope for experimentation and pursuing design in a romantic and idealistic fashion?

The Guwahati International Airport offered a considerable latitude for design explorations we wanted to devise. It is conceptualized to trigger moments of discovery and togetherness, infused with the flavours of the undulating land – Assam. The project showcases the cultural aspects of the northeast with features such as the tea gardens in the forecourt and an indoor forest ambience for the inbound travellers. The form of the structure takes inspiration from Icarus – the mythological figure who dared to fly. The concept of Origami finds expression in the terminal roof, flooring patterns, column cladding, theme walls and even signages. The new integrated Terminal Building at Guwahati International Airport is an ode to the reinvigorated spirit of Assam.

What are the future trajectories of DFI in terms of upcoming projects, research and initiatives taken? Has DFI undertaken any pandemic induced design intervention?

The future trajectory of DFI suggests a path directing towards more projects that are based on the narrative of Nation Building. The pandemic has ripped off the veneer of development that we were all very complacent about and exposed many loopholes in all kinds of public infrastructure. It has become even more pronounced how our health infrastructure and logistics collapsed in a time of crisis. We at DFI look forward to venturing more into healthcare and logistics. A disaster as severe as the ongoing pandemic calls for collaboration of all hands on board. All design minds and design assets available to the country should be roped in to create robust health care and logistics infrastructure that help us cope better with future disasters.

Learning lessons from the current crisis, the desire to connect with nature has never been more prominent. Interweaving breathable open spaces, natural ventilation and greenery as part of our indoor spaces and infrastructure in the public domain suggests the way forward in terms of design innovation.

Guwahati International Airport.

Parking structures covered with Photovoltaic panels.

Upcoming project: Amtron BPO Tower in Assam

Studio Lotus

Integrated Production Facility for Organic India

Reincarnating industrial architecture root and branch

Aerial view of Integrated Production Facility for Organic India,

By Sakshi Agrawal

Studio Lotus has conceptualised and built the Integrated Production Facility for Organic India located in Lucknow, Uttar Pradesh. This campus consolidates the production, processing, and administrative functions of the wellness brand into a facility that is not only sustainable in its material and energy consumption but also prioritizes the overall well-being of its occupants. The built fabric is a permeable brick structure with expansive open spaces around it. Such a context renders an earthly picturesque feel to the setting, something startling to find in manufacturing units. The project is a LEED Platinum-Rated Development which elucidates that the design is energy-efficient, occupant-friendly, and also benefits the planet.

The project is a sprawling campus located in Chinhat, an industrial area on the outskirts of Lucknow. The site is surrounded by scattered low-rise developments and small manufacturing plants amidst small barley and legume fields. Such a verdant backdrop has been capitalized by Studio Lotus to create an enriching environment for both the workers and administrators. The built vocabulary of the facility has been articulated in brick and concrete, with sleek lines and planar symmetry characterizing the façade design.

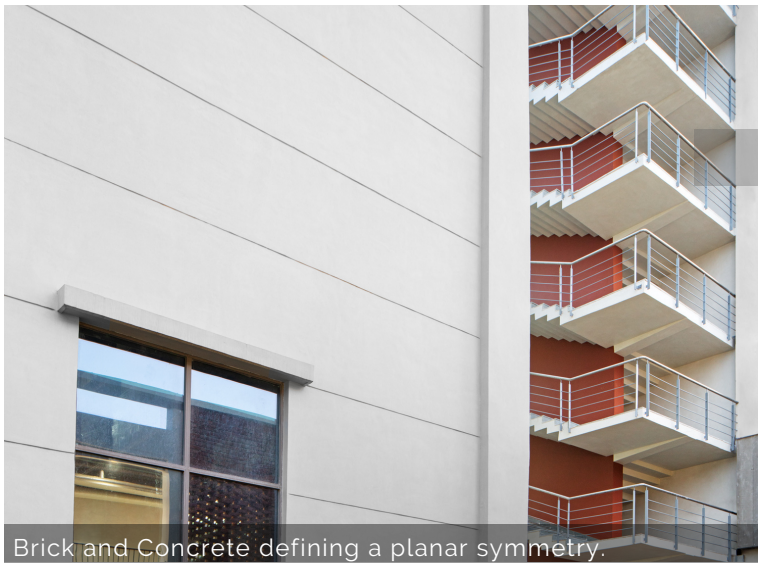
The design scheme of the facility imbibes local influences to create a sustainable built environment, the primary among these being the use of bricks as the primary infill material. Left exposed, the facility's brick shell harkens to the regency structures of colonial Lucknow.

Site Planning

The building's footprint is marked off by two sets of intersecting axes which create interior pockets that become courtyards, lightwells, and lawns. These internal spaces become spots for interaction and relaxation for the staff. These axes are also tilted at an angle to the site boundary as a result of which the built-form creates large open spaces along the periphery. These outlying spaces accommodate staff parking, heavy vehicle manoeuvring, and off-loading, and recreational facilities towards the east, west, and north zones while positioning services in the south zone in accordance with Vastu principles.

Worker, visitor, pedestrian, and vehicular access has also been acutely segregated, with the main entrance for the Production Wing being given from the western flank. This relatively private access provides workers with the opportunity to assemble before starting work as well as clears the driveway for incoming lorries. Preceded by a large lawn, the entrance along the western flank opens into a set of decontamination chambers for the workers, which allows them to systematically execute hygiene procedures before entering the Production Wing and subsequently the Raw Materials section.


Tessellated brick screen on the facade.


Brick and Concrete defining a planar symmetry.


Recessed opening cut-out solar glare.


The sprawling campus amidst the greenery.

Waterbodies creating a cool microclimate.

Cafeteria.

Planning – Production and Processing Facility

The Production Wing ensures seamless transfer of raw material to individual processing units, and their subsequent movement to the packaging department. The Raw Materials section is a triple-height space, with a sophisticated pulley system installed to move goods to the top floor — from where they are moved laterally to the processing units. The processing units are housed in 3 m wide modular rooms, each designed to specification for the machinery housed within. The goods are then moved through a top-down processing system with preliminary steps like sorting and drying executed at the topmost floor, and more sophisticated secondary functions executed on the ground and first floor.

The goods, having moved down the production line, are loaded onto a conveyor belt connecting the Production Wing to the Finished Goods Block, which is located towards the Northern end of the site. Here, the processed goods are inspected, packaged, and made ready for dispatch. The Finished Goods block — which is adjacent to the Quality Control Department — opens into a driveway with restricted access, allowing approved goods to be moved off-site without disturbing the functions of the rest of the facility. This movement of goods from the Eastern to the Western side of the site marks the production line, forming the functional spine of the facility.

Planning – Administrative and Recreational Spaces

The spaces supporting the administrative functions of Organic India complement the site's functional spine, extending from the Finished Goods block to the drop-off for the Raw Materials section. The built vocabulary of these blocks is porous and composite, as compared to the monolithic appearance of the processing wings. To the eastern end is the Experience Centre for Organic India, a two-storey space wrapped in a tessellated brick screen; the facility's amphitheater and temple precede this center — the three, in conjunction, mark the visitors' zone of the facility. The office spaces, expressed in a similar vocabulary, about the Experience Centre — extending towards the west in a linear configuration, and housing the Finance, HR, and Sales departments. Ancillary functions for the administrative staff are located towards the end of the Administrative Block, and consist of meeting rooms, a gym, and the cafeteria. The administrative spaces of the facility wrap around a large lawn, facing north. A large tree retained on-site stands in this lawn and has been christened the Bodhi Tree for the campus to pay homage to Organic India's commitment to mindfulness for the self and for the community. The administrative spaces, through numerous balconies and box windows, look into this lawn. The provision of nooks and perches along the building envelope lends a meditative quality to the workspaces.

Sustainability and Energy-Efficiency

The design scheme of the facility imbibes local influences to create a sustainable built environment, the primary among these being the use of bricks as the primary infill material. Left exposed, the facility's brick shell harkens to the regency structures of colonial Lucknow. Bricks are also locally available due to the abundance of labor-intensive kilns and the availability of pliable clay, lowering the carbon footprint of the campus. The fenestration strategy, in turn, has been devised to provide an optimal wall-window ratio to each zone. The processing blocks have limited ingress of light, facilitated through skylights and northern lights, to prevent spoilage of goods. On the other hand, high ingress of light has been enabled in the administrative blocks, to help lower dependence on artificial means of lighting.

The interstitial open spaces on campus further aid climate control in multiple ways, primarily by enabling passive cooling of the blocks through the stack effect. The abundance of open spaces and limited hardscaping also increases the potential for recharging the groundwater table. The design of the facility also ensures the channeling of surface run-off for reuse, as well as recycling of greywater discharge — the result has been the reduction of potable water consumption by more than half of the initial demand.

The design scheme utilizes a gamut of passive cooling techniques including terracotta filler slabs in the large-span spaces and recessed openings to cut out solar glare. Over one-tenth of the material used in the construction of the facility is recycled. As a result of these interventions, among many others, the project has been awarded a LEED Platinum rating.

> The building's footprint is marked off by two sets of intersecting axes which create interior pockets that become courtyards, lightwells, and lawns. These internal spaces become spots for interaction and relaxation for the staff.

Impact

Since the dawn of the Industrial Revolution, the design of production facilities has largely been cold and dreary with little attention to aspects like energy efficiency and the psychological needs of the workers. Through this project, Studio Lotus has been able to create a stellar industrial campus that speaks of sustainability in every respect. The expansive open spaces, permeable built fabric, focus on community and introspection, and prioritization of the workers' safety and comfort over all else has created an architectural template for all future properties for the company.

Ingress of light through skylights.

Rhino Machines

Manish Kothari

A pioneer of green and innovative building blocks and equipments

By Shriya Goyal

Rhino Machines Pvt. Ltd. commenced in 1983 as the brainchild of Mr. R. C. Kothari, and has been led by his son, Mr. Manish Kothari since 1991. Established as a project consultancy firm, Rhino evolved into a manufacturing firm producing cutting edge foundry equipment with world-class technology. With the tagline "Meeting challenges is a way of life", Manish discusses their patents, international endeavours and a drive towards sustainability through their practice.

Your patent for waste recovery in 2000 comes across as a very interesting and efficient initiative. What led to the development of this approach? Can you elaborate more on this?

In 1998-99, following our mission for waste recovery and energy efficient solutions as a social responsibility, we came across the need to address CO2 gas waste produced in the sodium silicate bonded sand process in the foundry industry. The moulding process was cheaper and used extensively in India, but lacked solutions to reclaim sand after its first use.

Inspired by mechanical abrasion principles, and with the experience of our founder Mr R C Kothari as a metallurgist, we found a possibility. We started with a small pilot of 20 kgs, and found a foundry to participate in the development of this technology. After it's success, we sized it up to produce a larger capacity that was documented and patented later. Till date we have successfully supplied more than 60 machines in different parts of India where Rhino provided technical support to stabilize the process. One of our customer testimonials states that during riots, since they could reuse their own sand, the production did not stop. The key technology was simple; rub sand grains against each other and use their inherent abrasion properties to remove the coating which made the silica sand unusable. With an inkling for commerce, we documented the costs, made viability calculations, and found that the investment could be recovered between 6 months to 2 years depending on the cost of virgin silica sand.

> The future of SPB can be projected as a new green recycled and recyclable material that uses the advantage of plastic, sand and dust; does not degrade over 1000 years, augment resource efficiency and reduce waste substantially.

What led to the alignment with Fata Italy? How will Silica Plastic Blocks be more beneficial than other materials? What is the future for these blocks?

Since the CO2 reclamation experience, we had been on the lookout to address the Green sand (water bound bentonite/clay) process used by more than 50% of the foundry industry. Fata Italy had the experience required to handle large green sand reclamation plants, and our pursuance found a way to connect to them, resulting in a MoU signed in 2013 to work together. The relationship was based on manufacturing in India, so the technology could be absorbed, made affordable and could be easily implemented. In the year 2015, we made a pilot plant, and when we commissioned the first commercial plant in 2016, we came across another issue – residual dust. While we could recover 70-80% of the material, we were left with 20-30% waste dust, which had disposal challenges. Being less than 100 micron in size, the dust could fly when dumped and add to the pollution problem. Recognizing the issue, Rhino's R&D division started working towards finding a solution in 2017-18. After testing with conventional fly ash or red brick to use a part of the dust, we came across a technique to use plastic with sand. It took us about a year to find the right combination and another to optimize the process and establish the economics.

We experimented and established a bonding of unsegregated plastic waste that constitutes – polyethylene, polypropylene, hdpe, ldpe and a difficult multi-layer plastic package in proportion of about 20% to 30% (tested upto 50%) with dust waste from foundry and the discarded sand waste. The SPB (Silica Plastic Block) is produced from 100% waste and can be recycled and moulded again. This helps to raise our resource efficiency in 2 ways – by reusing the resources and reducing the consumption of new materials. As I write we continue to explore different possibilities with SPB. We started from conventional bricks, and moved to multi-purpose paver tiles with distinct designs, varied sizes and diverse applications.

We have initiated a research on SPB to establish its properties as a composite material, so that it can be used for diverse applications such as manhole covers, gratings, benches, table tops, interlocking bricks and engineering applications. The future of SPB can be projected as a new green recycled and recyclable material that uses the advantage of plastic, sand and dust; does not degrade over 1000 years, augment resource efficiency and reduce waste substantially.

Silica Plastic Blocks.

Rhino Machines have collaborated with various different national and international agencies in regards to your drive towards sustainability. Can you elaborate on your different affiliations and how they aided your practice?

We have been one of the enterprises selected for UNIDO (United Nations Industrial Development Organisation) - Ministry of MSME program for clean technology, as part of the sustainable development agenda of the United Nations. In 2015 and 2016 we were one of the top 6 semi-finalists in India and the only one to be selected in the foundry industry. The engagement with UNIDO led to participation in understanding the relevance of MSME in 2030, which led to getting connected to UNCTAD (United Nations Conference on Trade and Development) flagship program Empretec. This program was recognized in UNGA (UN General Assembly) in nov 2018 to play a key role in capacity building, entrepreneurship development and impact sustainable development goals.

In the year 2015 Rhino partnered with Anwesha Foundation to install the Swiss Vocational Education Program (under license) in its premises to meet the gap in quality of manufacturing workforce. For over 6 years, the entire program continues to be funded by the partners of Anwesha Foundation, without any government grant, to maintain the quality of education, rather than churning out quantity.

In the same year, Rhino helped form Meemansa in collaboration with Priyanka Bapna, who had 20 years of experience in Textile Design and Manufacturing, but struggled to scale up. This association allowed Rhino and Meemansa to absorb the technology developed by IIT Mumbai - Duraprot® and Duraprot Plus® during the pandemic. This is a combination of simple organic and natural chemicals used to upgrade ordinary cotton fabric to N98 (98% filtration – better than N95), hydrophobic (like surgical masks), self disinfecting (deactivates Corona Virus and Bacteria), reusable and washable masks. One of these masks can replace the disposal of 100 surgical masks, and even after the efficacy is over, they are biodegradable. Meemansa carries a similar vision – a zero waste mission and environment consciousness. All these affiliations have led to the growth of our organisation in terms of brand, community contribution and the understanding of being responsible enough for sustainable development goals even as an MSME.

Duraprot Face Masks at Meemansa.

How do foundry and casting products affect trends in architecture? What has been your contribution for the same?

Foundry and castings do not directly impact the architectural sector, but foundry is at the core of any infrastructure. Our recent innovation using dust from foundry and building SPB blocks for architecture is perhaps the first direct connection between foundry and architecture.

> The affiliations have led to growth of brand, community contribution and the understanding of being responsible enough for sustainable development goals.

How has the ongoing pandemic affected the manufacturing industry? Are there any modifications made due the same?

The immediate impact of pandemic on non-medical industries has been severe. The first set of manufacturing industries to get affected was the textile industry, we had nearly 9 months of zero supply to our primary customer base. However it was the collaboration with IIT Mumbai for social awareness through which we started production of masks, both ordinary and medicated, that allowed us to keep people occupied in this otherwise depressing scenario.

In our education system, we quickly shifted to online training, and continued our small interventions. We used this opportunity to revise our plans to upgrade their ITI training and give them a new course, also increasing our engagement with engineers and providing practical boot camp at Rhino's premises. In our machinery manufacturing segment, we invested time to understand and strengthen our systems, preparing for an expected boom in the market. We developed our SPB project further, prepared business models, understood the market size and possibilities.

ITI Swiss Vocational Training by Mr. Manish Kothari

Rhino Machines - A part of the change for sustainablity.

What are the future endeavours for Rhino Machines in terms of design process, upcoming projects, research and initiatives taken that we should look forward to?

There are multiple aspects we are working on, while keeping ourselves aligned to the core vision, values and mission. We are preparing to scale up the business model for Silica Plastic Blocks and expect 5 projects to be implemented by March 2022. We have also initiated joint research with academia, and expect to complete the same by March 2022. We are preparing for a cluster model in sand reclamation, and anticipating a good demand since the resource crunch and costs of input materials in addition to the pollution requirements will be driving this business. We are extending our MultiFlex Moulding lines to global markets with automation to grow our business.

We are continuing our intervention in community development with the Empretec Program, Industry Associations, NGOs and the Academic community. Investing in building models for education, waste to wealth solutions in our areas of expertise and to partner with others to extend the models jointly is on our list of priorities. We have adapted the principle – when the tide rises, all ships will rise, and we are putting our effort on working with inputs which will raise the tide, resulting in the growth of our organisation.

JAGAN VENKATARAMANAN

FOUNDER AND MANAGING PARTNER
V+S DESIGN PARTNERS
KONNECT AEC

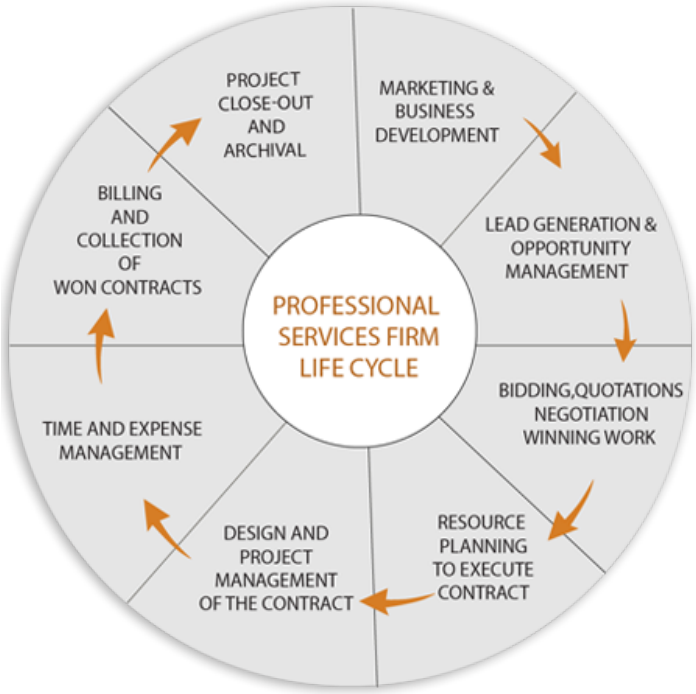
Future of integrated architectural and engineering consulting practice platforms and other technology-driven workflows in the AEC market space

Jagan Venkataramanan is a man with many feathers in his cap. Starting out as a Civil engineer by certification, he holds two master's degrees – one in structural engineering and another in sustainable architecture. After 21 years as a senior partner at Venkataramanan Associates, he decided to follow his passion and started his own ventures - Konnect AEC and V+S Design Partners. Through these ventures, he aims at providing services to improve project-based workflows in AEC offices and promote the spirit of collaboration.

You began your career as a Civil engineer. What inspired you to take a turn towards core architecture?
I grew up in a family of architects and civil engineers. My grandfather was a chartered civil engineer. Although an entrepreneur at heart, he did not set up an independent practice. My father, an architect and an entrepreneurship enthusiast like my grandfather, set up Venkataramanan Associates in 1969 after a brief period of working with reputed firms. I also have several uncles who have worked in the AEC sector. These early influences drew me towards architecture and engineering. I had an equal inclination towards the creative and technical aspects of construction. Hence, I decided to pursue civil engineering for my bachelor's degree as a start. To expand my knowledge and sharpen my skills further, I majored in structural engineering in the US for my master's degree and then followed it up with a master's degree in ecological architecture as well. There, I had the opportunity to work in some leading A/E firms in the San Francisco bay area, and also to do some research work along with top professors and researchers like Dr. Egor Popov, Prof Emeritus at Structural Engineering Faculty at the University of California, Berkeley. In San Francisco, I worked in large A/E firms specializing in advanced technology manufacturing, housing, and healthcare projects. There were phenomenal opportunities in India at that time; it made me want to contribute to the architectural family business back home.

What incident/project marked the turning point in your career that prompted you to move on from being a Senior Partner at Venkataramanan Associates to co-founding V+S Design Partners?
After working on massive Greenfield projects for fortune 500 firms, like GE, Dupont, VW, Pfizer, AstraZeneca, and Syngenta, and large Indian companies like Reliance, TCS, and Infosys amongst others, I decided to end my 21-year-old, satisfying stint at Venkataramanan Associates. I wanted to embark on my own journey of revolutionizing how buildings were being conceptualized, designed, planned, and even managed all the way up until the time of handover. Armed with domain knowledge of what works and what does not, we started V+S Design Partners along with a group of like-minded architects and engineers with similar expertise and interests.

I wanted to judiciously combine my India and US-inspired, 25-year-old acquired on-site skills and in-office efficiency. It was time to migrate from traditional CAD-based workflows to BIM-based workflows for the country as well. Other domains like aviation, oil and natural gas industries, mechanical and automotive industries had long embraced these technologies in their workflows and the A/E industry was generally left behind. With the recent emergence of AI, ML, big data, API, and canned software products, it was a no-brainer for me to use these technologies to improve efficiencies and reduce waste, consequently promoting sustainability and enhancing profits of clients and businesses we work for.

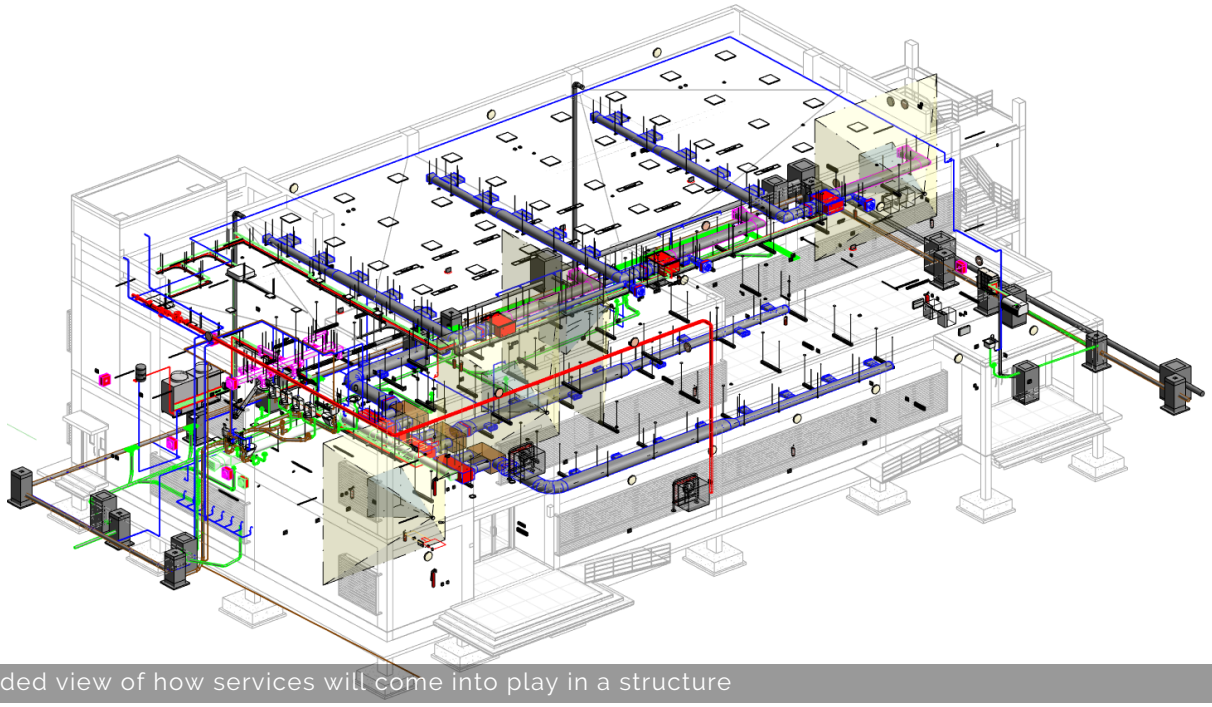


You are well-versed with both design and structures. What advice would you give to young architects and engineers individually, which shall help them realize that they are indeed two sides of a coin?

There is a quote by Andy Warhol which I like, "There is beauty in everything, just not everybody sees it" I try to see this element of beauty in everything I do and experience. It is a mandate for youngsters to be open to constant learning and to be relentlessly curious. It is necessary to remind ourselves that the world of A/E is a big ocean that is constantly evolving and morphing, and it is impossible to know and become an expert at everything. One has to learn to be humble to gain knowledge and expertise. One has to accept being a life-long student. Being up-to-date on what is happening in the industry along with other related industries, progressing at a more rapid pace, is a must. It is imperative to understand the fundamentals of engineering and design principles early on. I, unfortunately, learned of its importance much later in life. In the formative years, it is advisable to work for a great company. More importantly, with a great leader who has vast experience, willingness to mentor, and a vision to share. Working with a clear mission and pursuing excellence must also be prioritized.

How important a role do BIM software and tools such as ERP play today? What do you foresee in the future in terms of architecture and technology?

I have worked from brick-and-mortar tools and hand drafting days in the early nineties to the use of spreadsheets, small custom engineering software programs, and CAD-based software, and more recently to BIM-based workflows and software. Past workflows had several drawbacks like disjointed and siloed information which led to inefficiencies and loss of data, at various stages, before final collaboration and delivery. The BIM workflows that we have developed and evolved are based on the principles of a common data environment (CDE) that relies on a single 'source of truth' and the recent standard which is the ISO 19650. The ISO 19650 is a great initiative to uniformly define owner goals and needs, all the way through design, planning, testing, and handing over in an integrated platform. It eliminates many shortcomings of CAD-based workflows and relies more on CDE and ERP-based workflows. The whole world is swiftly adapting to delivering projects like this, and we hope to be leaders in India in this transition.



Exploded view of how services will come into play in a structure

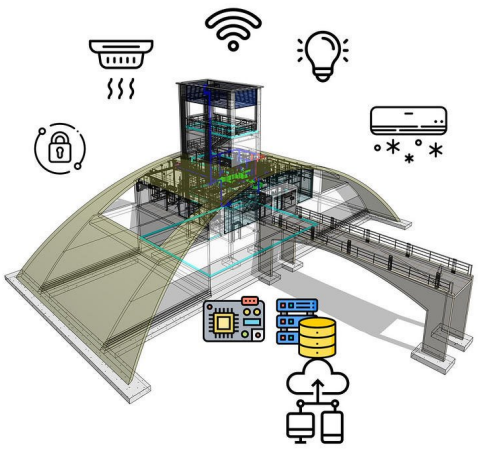
Besides Konnect AEC and V+S Design Partners, are there any other ventures you have in mind, any different domain you have your eyes set on?

These two ventures are pretty diverse. We will branch out into sub-sectors like helping large/mid-size design firms, general contracting firms, and A/E firms that would like to set up centers of excellence in India due to the enormous talent available at a fair price compared to the western countries. We wish to see Konnect transition into a technology-based software services firm offering cutting-edge services to improve workflows. Eventually, the goal is to increase collaboration, efficiency, and profits for project-based A/E/C and other related firms.

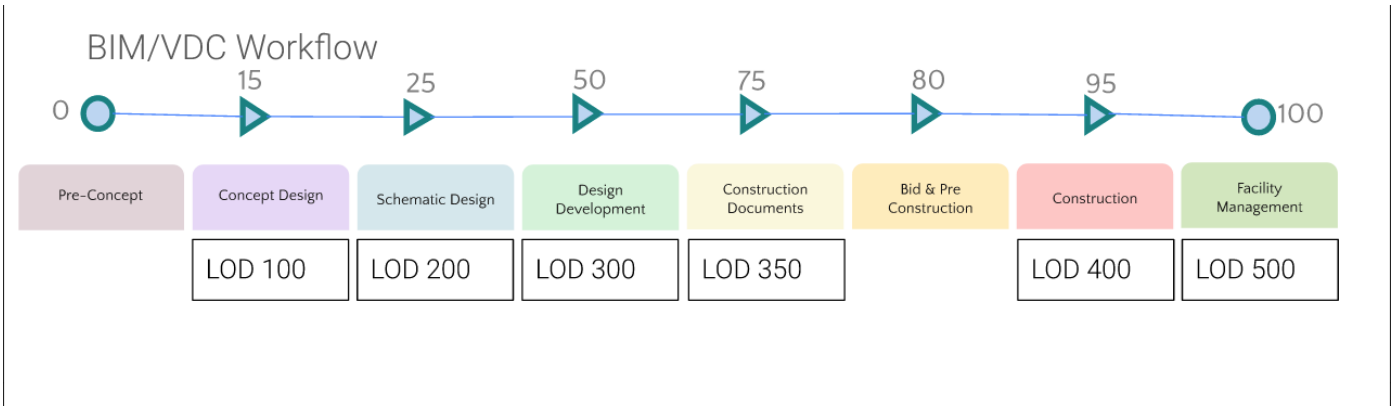
Lastly, what projects are you currently working on?

We partner with A/E firms and building facility owners/developers to help them improve their workflows as we are generally software agnostic and look at the right tools which could benefit the collaborative process. We have recently worked with Sundaram Architects (www.sundaramarchitects.com) on some projects which are in the aviation, automotive, and life sciences sectors. We assisted them right from the concept and all the way to the completion stages of the project. We also work with GC's and BIM consulting firms in a B2B relationship based in other countries, including the US, on various BIM services and dimensions. Each project's requirements and goals are different, and we offer a customized solution and tweaked workflows to suit the project goals and deliverable outcomes. No one solution fits all as it involves many moving parts involving people, processes, and technologies.

> With the recent emergence of AI, ML, big data, API, and canned software products, it was a no-brainer for me to use these technologies to improve efficiencies and reduce waste, consequently promoting sustainability and enhancing profits of clients and businesses we work for.



Graphic illustration of services from V+S Design Partners



BIM/VDC Workflow

Wallmakers

St.George Orthodox Church

An edifice of earthy materials, ancient techniques and historic significance


St. George Orthodox Church. Image Courtesy: Jino Sam

By Shriya Goyal

A remnant of Kerala's history and culture, the 400 year old St.George Orthodox Church witnessed years of dereliction and encroachment. To restore this ancient monument built in 1615 AD to its former glory, Wallmakers got on board. The Kochi based firm explored the possibilities of earth architecture and the historic significance of arches and vaults in religious built forms. The design of the church emerged through a series of dialogues between the masons, architects and clients. Taking inspiration from the symbols of eastern Christianity, mud took the centre stage in this contemporary edifice.

> Made from humble materials, the church is an attempt to foist awe and serenity with its rich spatial quality and respond to the footprint of the previous structure by the use of historic construction techniques.

Built for a small religious community of Kerala, the church demanded negotiation and an exploratory spirit from the architects to realize this dream. Unlike other local structures in Kerala that sport pitched roofs, St. George Orthodox Church stands out with its arches and domes. The team says, "Most traditional buildings in Kerala have pitched roofs, but being the result of a foreign religion, the churches were always constructed in different styles. The architecture of this church which was built on the existing foundation of the old church builds on the imagery of historic monuments." Rammed earth and compressed blocks became key components of the structure. The Nubian arches were constructed and stabilized using earth blocks. The altar and the aisles are supported by flying buttresses, built without shuttering. The team was inspired by the works of Tadao Ando and enveloped the central space with light filtering through the cross.

The masons received training to build with compressed earth blocks using the Nubian technique and a chain study method for stabilization. The Nubian technique is an old construction approach that involves masonry using earth blocks and mud mortar to create a wide range of arches, domes and vaults. It was reinstated by architect Hassan Fathy in the 20th century. It works on the principle that the blocks adhere to each other with earth as a glue. The dy blocks suck the water and clay of the glue and bind together. It is essential to keep the blocks thin, to maintain a high sticking area/weight ratio. The Catenary (chain-study) method helps in stabilizing the correct arch shape before the execution. Antonio Gaudi used this method in the early 20th century to define the shape assumed by a freely suspended chain. The catenary method gives the exact and ideal curve of the line of thrust, which represents the line of compressive stress in the arch.

The team says, "It is necessary to put in the time and effort to research on ancient techniques before implementing them on site. We have a lot to learn from vernacular techniques because they are sustainable and simplistic in nature. At the same time, the way forward is one in which we are not shackled by the limitations of these techniques, but one in which we study, improvise and implement to suit our contemporary needs." Regardless of the inspirations and influences borrowed by Vinu Daniel – founder of Wallmakers, the end result is an innovative contemporary design that exploits its ancient significance and the opportunity to build for a challenging programme.


The light filters through the cross in the central space.


The Oculus.


The Grill design.

The hike in demands have led to increasing use of resources and it falls upon the architects to use energy efficient materials. Mud is one such material that can be utilised through different techniques like earth blocks, rammed earth, wattle, daub, and many more. With the spirit to explore combined with pressing demands and an understanding of the surrounding context, the design was born. Made from humble materials, the church is an attempt to foist awe and serenity with its rich spatial quality and respond to the footprint of the previous structure by the use of historic construction techniques.

Consultancy Archiplan

Arun Goel

Draping native architecture along the contours of Dehradun

By Sakshi Agrawal

Consultancy Archiplan, a Dehradun based firm driven by Arun Goel garners local wisdom and seasons buildings with a "green-take". Arun's role in conceptualising and advancing sustainable development has been paramount regionally. He absorbs the client's requirements while tactfully enlightening them on the idea of 'authentic local architecture', to preserve the cultural fabric of Dehradun. The firm embraces a broad portfolio of works ranging from high density housing to industrial planning to hospitality and landscape. He discusses the design philosophies acquired over four decades of professional experience in Dehradun.

Arun's practice eyes Dehradun with the primary lens of how it was manifested initially. The city was designed for a population of 50,000 by the British. It was proclaimed as the city with 'Grey Heads and Green Hedges' until the 1970's and early 1980's. He mentions, "The entire city descends from North to South with a natural uninterrupted drainage, which has been completely disturbed due to insensitivity to nature and environment with urban expansion." With the raising of boundary walls around sub-divided smaller plots of land that have been carved out of erstwhile large chunks, the topography of the entire length and breadth of the city has been vastly besmirched. A little rain now sees waterlogging everywhere, with drains overflowing and having an unbearable stench and being filled with non-biodegradable litter. Besides, multi-storied housing dotting the horizon has veiled the lovely mountain view, which was characteristic of this beautiful valley town."

Abandoning these heterogeneous trajectories, Consultancy Archiplan has always adopted an approach that bodes well with the natural drainage of the land and captures the alluring hills keeping with the local climate. They treat the last vestiges of British architecture in the area with a fusion of local materials. Doubling down on the idea of reduced energy consumption, most of their projects feature substantial energy saving up to 30%. "This has been successfully achieved by bringing in the natural light and ventilation to each and every space including the stores and dress areas," says Arun. He considers cost-saving as a by-product of manoeuvring time-honoured techniques along with efficient completion within scheduled timelines. Neshvilla Residence in Dehradun is one such project where they availed 'pahadi' architecture and design principles. Exposed brickwork was adorned with colonial arches that hold the slab, as against RCC beams. The doors were sourced from Kumaon region villages of Uttarakhand. For the ceilings, instead of using normal plaster & paint, clay pots were set during the casting of the slab.

These pots were used much like how a coffer slab is constructed, wherein 'voids' are created in the slab in places where there is no actual need for excess concrete. This not only saves cost and material, but also vastly enhances the aesthetics of the ceiling.

> Multi-storied housing dotting the horizon has veiled the lovely mountain view, which was characteristic of this beautiful valley town.

Anirudh Ashram situated in the Tauli region of Uttarakhand, was envisioned to empower its regional communities by employing local workforce and utilising local materials. Built completely in exposed stone masonry and lime plaster walls, all materials were sourced within a 30 km radius. Local villagers were exclusively employed for construction processes like plastering the walls, doing the woodwork and laying the roof tiles. Such an impact-driven approach effectively reduced carbon footprint, transportation costs, labour costs and material costs, all while providing a source of income to the local villagers.

Year in, year out, clients are ambitious about Vastu compliant homes. Houses which are underpropped with Vastu design principles bring in a huge effect – both placebo and saleable aspects. Arun confers, "To us, Vastu is more to do with the uninterrupted energy flow in the building in and around, which we achieve through sensible placements of the spaces." However, they shun a crude Vastu compliance, which leads to a lack of sunlight or ventilation. To find an authentic building, which stands out, and at the same time blends in with the surrounding is an art slowly disappearing from our cities. And that expression for authenticity is what Consultancy Archiplan brings to its projects. Consultancy Archiplan is currently working on Everest Base Camp, a luxury camping resort at Hathi Paon, Mussoorie. Few of their upcoming ventures include Sarovar Barlowgunj, Mussoorie, Everest Base Camp, Mussoorie, multi-storey residences and other individual residences.


Anirudh Ashram, Tauli, Uttarakhand


Dudhley Manor, Dehradun


Neshvilla Residence, Dehradun


Consultancy Archiplan Office, Dehradun

GreenJams

Tarun Jami

Tackling carbon footprint with Agro-Based Building Materials

By Sakshi Agrawal

At a time when the construction sector accounts for 45% of the global carbon emissions, it is unwise to still settle for unsustainable practices of construction. A brainchild of Tarun Jami, GreenJams has addressed this problem with a new product line in the construction segment which is both green and environmentally efficient. Visakhapatnam based GreenJams is a start-up providing sustainable solutions by revamping industrial by-products, crop residue and hemp stalks.

The cement industry alone is a top source of stringent carbon emissions and the pressure to decarbonize cement production now is more than ever. GreenJams' BINDR™ uses 100% recycled industrial waste and is a sustainable replacement for Ordinary Portland Cement. BINDR™ is a miracle material that combines with hemp to produce Hempbloc™ and crop residue to produce Agrocrete®. Both these building blocks are carbon negative and curb air pollution by preventing the ruthless burning of crop residue. They also have insulating properties that reduce the operational costs of a building. Tarun's vision to create a carbon-negative environment is led by-products from GreenJams which may be among the top sustainable walling materials in the near future. He is also currently pursuing a Ph.D. in civil engineering focussing on hemp concrete from AcSIR at CSIR-Central Building Research Institute (CSIR-CBRI), Roorkee.

Agrocrete® Hollow Blocks

Agrocrete® Solid Block

What led to the beginning of GreenJams? What inspired you to experiment with crop residue as a core building material?

As a civil engineer, right from my undergraduate days, I was conscious of climate change and the role construction had to play in it. While it is called construction, in reality, it causes a lot of destruction and I was acutely aware of my role in it. Serendipitously, in 2013, as part of a college project, I had stumbled upon a material called Hempcrete. It caught my fancy for multiple reasons – it is carbon-negative, made of stalks of cannabis, and had amazing thermal insulation. I studied it academically until 2016, during which I also completed a Masters' degree in Environmental Science. In 2017, I had two options – choose a corporate career or pursue my passion. I chose the latter and established GreenJams with a vision to create a beautiful carbon-neutral built environment, and committed to bringing hempcrete to the Indian construction industry. In 2019, after two years of hard work and deep scientific study, I created the world's strongest hempcrete. Soon, I had convinced my father to quit his job at Tata Projects Ltd. and join GreenJams. My younger brother, Varun, who is also the co-founder, found his calling in the company's mission. In late 2019, I was attending a meeting in Delhi when the air quality had gone beyond extremely severe. By the evening, I was severely impacted by the poor air quality and almost crashed my car because of it. Upon returning home to Roorkee I researched the issue and found that 44% of the particulate matter in Delhi's poor air is because of paddy straw burning. I went back to the drawing board and used paddy straw to come up with a building material similar to hempcrete. In the process, I ended up creating an amazing load-bearing material that was significantly better than hempcrete.

Can you shed some light on Hempbloc™, Agrocrete®, and BINDR™? How would you explain these materials and their carbon neutrality to a layman?

BINDR™ is a clinker-free 100% up-cycled low carbon replacement of Portland cement made from industrial by-products of steel, paper, and power industries. It is used for masonry mortar and plastering. Hempbloc™ is a carbon-negative building material made from the stalks of the cannabis plant and BINDR™. It is a non-load-bearing material used for non-structural walls and insulation.

Agrocrete® is a carbon-negative building material made from crop residues like paddy straw, bagasse, corn stalks, and BINDR™. It is available in three forms: solid blocks, hollow blocks, and pre-mix plaster. Solid blocks are load-bearing and replace clay bricks, fly ash bricks, and concrete blocks. Hollow blocks replace AAC blocks and others for non-structural walls and offer high thermal insulation.

BINDR™

BINDR™ Plaster Application

Project in Surajgarh using materials from GreenJams.

Project in Surajgarh using materials from GreenJams.

Roorkee Demo Project by GreenJams.

Mason team.

Can you explain your business model of decentralized production with licensed technology? Is this a step to further reduce the embodied energy?

Bricks and blocks shouldn't travel long distances (should be less than 250km) for two reasons, namely, cost efficiency and sustainability, which in turn impact the embodied energy and embodied carbon. Therefore, it is imperative that the manufacturing has to be de-centralized satisfying local demand. It is impractical for one entity to establish hundreds of manufacturing facilities across India and operate them, because of the heavy Capital Expenditures (CAPEX) and Operating Expenses (OPEX).

To overcome both these challenges of sustainability and capital inefficiency, we have developed a franchising model where we supply the key component, BINDR™ to the franchisees and they manufacture Agrocrete® blocks. We develop the market for the blocks, provide technical support and maintain quality checks, in exchange for a royalty on sales.

Do you feel opinions towards waste as a raw material are changing in the industry?

Indians have always treated waste with care. Culturally, we have always been slow to waste. That's probably why we find so many waste-to-wealth initiatives in our country. "Waste" has always been a resource for us and it will continue to be so.

Has the restricted supply of cannabis been damaging the commercials and economic viability of your products?

We have one cannabis-based product, Hempbloc™. Yes, the limited supply of raw materials does make the product unviable in the prevailing market conditions. It is 3-5 times more expensive than conventional building materials, making it difficult to find a market.

Affordable housing has been a major crisis in our country. Do you think products from GreenJams can contribute to affordable construction?

Absolutely. Good quality building materials are still very expensive in our country, which makes construction unaffordable. Furthermore, conventional materials are not thermally insulating. Even if construction costs could be reduced, operational costs would still remain high. Our products are able to reduce the cost of construction while retaining the best-in-class quality and providing much higher thermal insulation. Through Agrocrete® and BINDR™ we are able to drive lower construction costs and operational costs. We can lower construction costs by up to 50% and improve building energy efficiency by 25%.

What are your future trajectories and how do you envision GreenJams shaping in the near future? How long will it take for these hemp and agro-based blocks to replace everyday construction materials?

This financial year our target is to cover 100,000 sq. ft. of built-up area with Agrocrete®. We will also be establishing a new manufacturing facility with a capacity of producing 3000 blocks per day. In 2022-23, we are looking to add at least 6-8 franchisees to our manufacturing network. In the next 5 years, our manufacturing network will have at least 50 franchises across the geography of India. We also have our sights set on expanding our manufacturing network to international markets. Hempbloc™ will take significantly longer because of the low scale of current hemp cultivation. Agrocrete®, however, will get adopted much faster than Hempcrete because of the great cost-benefit and value creation.

Having said that, I don't think Agrocrete® or Hempbloc™ will completely replace current construction materials. Despite being around for more than 40 years now, fly ash bricks haven't been successful at eliminating clay bricks. But we do believe Agrocrete® will take a sizable chunk of the market in the next 10 years.

> Indians have always treated waste with care. Culturally, we have always been slow to waste. That's probably why we find so many waste-to-wealth initiatives in our country. "Waste" has always been a resource for us and it will continue to be so.

Lastly, what is the role of the construction fraternity in driving climate change?

Buildings contribute to almost 45% of global carbon emissions because of the space conditioning requirements and the manufacturing of building materials. Just by virtue of the climate change caused by the construction industry, conservatively, India could lose almost 10,000 sq. km. of landmass to the rising sea levels by 2100, creating millions of 'climate refugees.'

Agrocrete® wall under construction

Agrocrete® Plaster Application

Within N Without Architects

Stone House

Magnificence in stone

The Stone House by Within N Without Architects.

Classical lamp post with stone walls create drama.

By Sakshi Agrawal

Stone House is a residence that camouflages itself in the beauty of lush greens of Brahmagiri hill of Trimbakeshwar, Nashik. A brainchild of architect Shailesh Devi and team at Within N Without Architects, the spatial quality of this stone abode aligns with modern-day lifestyle while following the traditional flow of spaces.

Stone House is built along the native contours of the site and is constantly in a dialogue with its natural context. The site's most striking feature is the presence of mountains. Human association with mountains has been long regarded as an intimate connection to the divine in the Greek mythology, the Bible and other cultural institutions. This interrelation heightens with the breath-taking beauty of the hilly slopes of Brahmagiri mountain. This residence comes full circle emphasizing on the excellence of stone as a building material.

The initial concept was based on a functional layout that draped itself along the terrain. Gradually, the design evolved in form and volume creating spatial and visual interest. Access to this 1200 sq. ft. house is through a journey of unfolding views that resonates the experience from the landscape thus giving native flavour to its architecture that belongs to this place. The built mass physically adapts to the site slope to create a unique spatial experience. The main walls create tapering volumes merging into the alluring greens of the hills. A hammock near the dining court adds a playful element and enhances the dynamics of the court.

The semi-enclosed living space on the ground offers a platform to enjoy the scenic views from the surrounding landscape and thus truly becomes the centre of this residence where the landscape directly flows in. The deep shaded place serves as a retreat during summer day or, any evening or early morning. It is a quiet place for reading and relaxing, a pause point to look over which also turns out to be an interactive place to sit and talk with family and a congregation space for social gathering.

Access to this 1200 sq. ft. house is through a journey of unfolding views that resonates the experience from the landscape thus giving the native flavour to its architecture that belongs to this place.

Stone House is an interesting design intervention in the hills where stepped terrain and local materials have been exploited to their best use. Such buildings exemplify the acumen of stone as a modern construction material. It becomes difficult to determine who is the main protagonist – the building or its environs.


Built camouflaged within the landscape.


The built form frames views of the lush greens.


Interiors offering scenic views of the Brahmagiri Hills.

Gohemp Agroventures

Gaurav Dixit

Promoting plant based building materials and bridging the gap between architecture/construction and agriculture

By Shriya Goyal

Polluting construction practices and the built environment have become a threat for our livelihood. "If we can change the way you think about buildings, maybe what you build will change the world." rightly stated by Late. Dr Prem C Jain, father of the green building movement in India. Abiding by his principles, Gohemp Agroventures established in 2018, aims to bridge the gap between architecture/construction and agriculture by promoting plant based building materials. Co-founded by Gaurav Dixit, Hardik Jain, Namrata Kandwal, Deepak Kandwal and Priyank Jaiswal, the company is growing and extending collaborations with architects, clients, innovative farmers and entrepreneurs.

> Native designs are not created on drafting boards within a deadline; rather they evolve and grow organically with time just like a plant, adapting to the surroundings. Vernacular architecture addresses the context in terms of climatology, building comfort, material efficiency, environmental impact and cost effectiveness.

"We grow our food, we grow our clothing, we grow our medicines, and we also grow our building material." - Gaurav Dixit, Cofounder Gohemp Agroventures

The research for hemp based materials began in 2017, while the founders were still practising architects in Delhi. The environment depletion and climate crisis, made them realise the urgent need for sustainable and healthy building materials as an informed choice for clients. Challenges became the steps to growth. Legalities associated with hemp, raw material collection and processing, mechanization of processes, and bringing the material into mainstream construction industry by awareness, commercial production, standardization and listing in schedule of rates were some of them. Gaurav says, "We have also trained a small team and made them comfortable with the material apart from establishing an inhouse hemp processing facility to fulfill our need for the processed raw material." A startup recognised by the Government of India, Gohemp aims to be a global leader in the hemp based growable building material segment.

Sustainability is a word that is often tossed about carelessly, but with the environmental crisis continuing to mount, the design world will undoubtedly focus on a sustainable, eco-friendly and vernacular approach. Gaurav voices, "Native designs are not created on drafting boards within a deadline; rather they evolve and grow organically with time just like a plant, adapting to the surroundings. Vernacular architecture addresses the context in terms of climatology, building comfort, material efficiency, environmental impact and cost effectiveness. We believe that vernacular architecture is not a dead past; rather it is alive. Whatever conscious interventions we do in it, add to its library."

Hemp is rapidly making a comeback in commercial agriculture providing raw material to food, shelter, clothing, wellbeing and energy industries. Many countries are already working on massive scale hemp production to boost their growth sustainably and to cope up with the economic downfall they have faced due to the pandemic. Gaurav states, "India is also picking up, with Uttarakhand being the first state to make industrial hemp policy, followed by Uttar Pradesh. Other states like Himachal Pradesh, Madhya Pradesh, Karnataka, Punjab, etc are also working upon it and in the coming few years with the rise in licensed hemp cultivation, the crop residue will be a useful resource for sustainable construction and if not utilized wisely it will pose a similar threat like parali, quickly becoming one of the highest biomass producing crops causing pollution. Similar to hemp there are other crops which can be utilized in ecological construction like bamboo. Growable materials are definitely the future of construction."

Recognised by the Government of India, Gohemp aims to be a global leader in the hemp based growable building material segment.

The Hemp Crop.

Hemp Shives.

Recognition by Government of India.

The Himalayan Hemp Eco Village project.

Hemp-Lime Roof insulation.

Hemp Blocks.

Gohemp has undertaken a demo building called "The Himalayan Hemp Eco village project" conceptualized to be a homestay. The project sits in the lap of Himalayas in Yamkeshwar block of Pauri Garhwal. The building will provide an immersive experience of staying in a hemp structure and enjoying the serene life in the Himalayas. The building is conceptualized to be self-sustainable and zero energy in terms of its embodied as well as life cycle values. Solar panels to be placed on rooftop will make it self-sufficient in the energy requirements. Rooftop rainwater harvesting as well as waste water management attempts to improve the acute water shortage on the site.

The load bearing walls are made in locally quarried stone using mud mortar, where mud is obtained from site excavation and the stone is quarried nearby. Non-load bearing monolith hemp walls are constructed using recycled Sal wood as the structural framing component. The bathrooms are made in hemp lime blocks, testing their performance in a wet space. The interior and exterior plasterwork is done using either a hemp fibre reinforced lime mix or a hemp fibre reinforced clay mix. The sloping roof has a metal sheet on top of the wooden frame, instead of traditional slate tiles as it is not quarried locally and modern masons lack the traditional know-how of the material. To deal with the heat gain in summers, and heat loss in winters, a low-density hemp lime mix is used as insulation, protecting the inner space from thermal differences and also insulating the space from sounds of rain and hailstones during harsh weather. Hemp bio aggregate lime concrete is a versatile mix, where the ratio of hemp lime can be altered to reach various strength versus insulation ratio. It can adapt to the climatic requirements to get desired insulation and strength in the blocks or cast in situ mix, or insulation mix.

Gaurav expresses, "We wish to encourage youth to live a life close to nature with all the modern comforts at the same time creating a zero-carbon impact on mother earth. This project is an effort to create a green building where zero waste is generated during construction, as well as during its lifecycle." With the Himalayan Hemp Eco village project, the firm is optimistic for a pan state success with support from Uttarakhand Government and Central Government. Gaurav further adds, "Hemp based building materials are made from waste of hemp fiber processing. Many textile giants are exploring the hemp fiber sector including the Aditya Birla Group. The construction industry will follow the growth of the textile industry and perhaps in 3-5 years hemp based building materials will be seen in mainstream construction. We have also partnered up with the Ministry of Housing and under the ASHA India program we are committed to make this technology available to common man in the country."

Discussing the trajectories for hemp products, Gaurav concludes, "Currently we are working on various mixes of hemp bio aggregate lime concrete which is a versatile material and could be used to make building blocks, monolith walls, wall plasters and building insulation. Hemp interlocking blocks eliminate the need of binder, water and speed up the construction process. Similarly, utilization of robotics in hemp based 3D printed buildings is a near future. Fungus based materials like mycelium are also potential future products which will make it 100% growable."

> We wish to encourage youth to live a life close to nature with all the modern comforts at the same time creating a zero-carbon impact on mother earth.

Hemp Fiber.

Lime binder binds the Hemp shives perfectly.

Hemp Board.

TECHNAL

A solution for innovative sun-shading facade at Ascendas IT Park, Pune

An ambitious project designed by the architects DSP Design Associates, Ascendas ITPP, Pune shall cater to the tailored needs of IT and BSFI enterprises and offer quality campuses that take care of employee well-being.

Article Contributed by:

Mr Amit Khembhavi, Director, Architecture – DSP
DSP Design is an international architecture and design practice catering to an array of verticals within architecture, interior design, and smart building solutions. Smart building technology and sustainability form an embedded part of the entrepreneurial work culture at DSP ensuring that practice delivers designs cut across multi-generational spatial expectations. Architect Amit Khembhavi – Director, Architecture at DSP, led the project design in sync with the client's ambition and specification.

Mr Rakesh Morudkar, CEO, RSM Design Solutions
RSM Design Solutions, the brainchild of Mr. Rakesh Morudkar is a facade engineering firm with a gamut of designers and engineers with operations spanning the Indian subcontinent. Their mission is to provide sustainable cost-effective building envelopes, addressing the latest developments in the façade technology, raising quality standards, and setting new benchmarks in the façade designing and engineering sphere.

The Project

It is being built by CapitaLand, part of the Singapore consortium, which is a leading contributor to the Indian IT Park industry development. Through close collaboration between various players, the building is designed with a facade system that fully meets the requirements of the architects and the client about design, function, and performance.

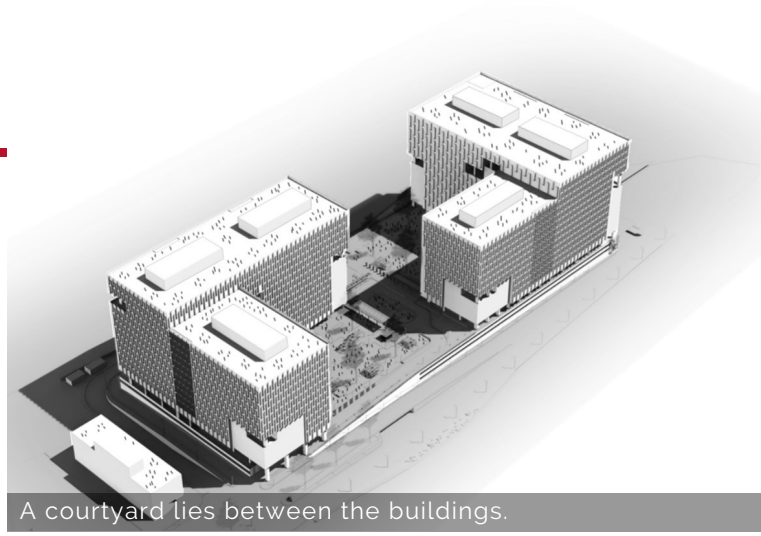
Design Concept

The design of International Tech Park Pune, Kharadi constitutes two interactive blocks with a courtyard in between. Facade design constituting high-performance glass and aluminum follows the considerations for eco-friendly design. Climatic concerns like solar heat gain and usability across all seasons are the key elements of basic design philosophy. Vertical fins, placed strategically to form interesting patterns, are intended to shade the large vision panels that allow better visual connection with lesser vertical obstruction.

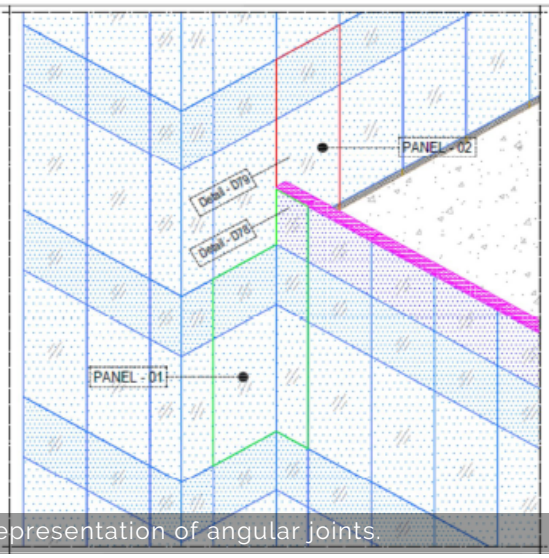
Technal facade: Technical application of facade system for the project

The façade of approximately 50,000 m^2 for the two major blocks is designed with unique sunshade elements. Glass panels of 1.5m width needed a superior façade system. Technal's split mullion unitized system - GEODE EL was chosen that offered many benefits, over conventional facade systems.

- Well-engineered 3 barrier systems offering unparalleled acoustic and thermal insulation.
- Better gasket profiles enhancing weather and water performance.
- Clean joinery details enabling consistent horizontal and vertical joints internally offering superior aesthetics.
- Constant project service support during production and installation ensuring seamless execution.

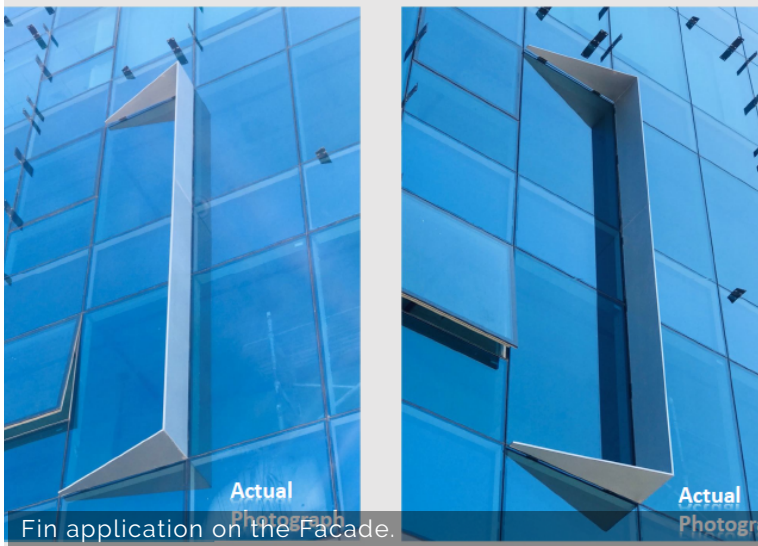


A courtyard lies between the buildings.



Schematic representation of angular joints.

Techal and Glazium Team with the successful testing of the façade element with fins



Fin application on the Facade.

The Engineering

The architects – DSP Architects and Associates came up with an innovative concept of a design for sun shading – a specially engineered fin that is 500 mm long, 20 mm wide, and 3mm thick.

To turn this concept into reality, RSM Design Solutions began to engineer the solution in line with their policy of zero deviation from the design intent. Thus, alternative designs, calculations, and analyses were done at ECO tech.

Considering the property's long life span it was proposed to go for a reputed and tested façade system complying with local and internal regulations and performance requirements.

It was conceptualized to install the fin at a distance from the façade line with help of specially designed brackets which were placed strategically not to hinder openable windows, ease of replaceability of glass, and at stack joints. The main function being no heat transmission from the fin to the system. A cantilever of 3 meters at the design of the façade was also considered.

Further, RSM proposed to use the same Technal system without any modification at the VRV location. Mesh and glass lines were not staggered, thus eliminating additional hardware, brackets, and labor for installation and in turn the total project cost. The facade also had another combination at the benchmarks refuge area.

The details proposed were correctly replicated without any deviation by Technal.

Design and Engineering of fins

The total number of fins for the facade is approximately 1800.

1. Design Consideration -
   - The width and thickness of the fin are designed taking into consideration the design load and safety factor.
   - The height of the fin was decided based on the panel grid height and the location of openable windows.
2. Ergonomics and Cost aspects -
   - The extrusion size was optimized and the wastage for the total fin was a meager 2.5%.
   - The horizontal fin element was cut diagonally from the total extrusion to give better yield.

Fin assembly and fixing

The horizontal fin element was joined at 90 degrees to the vertical part using a corner cleat, which was welded at the intersection.

Performance Mock-Up Test

A PMU test was carried out, at Facade India Testing Laboratory Murbad, for the Technal system with the fin element and it passed all the tests successfully with ease at the first go. The fin also successfully passed the Push and Pull test carried out.

The PMU was seamlessly executed by Glazium Facades Pvt Ltd and the project is now under execution by them. Glazium Facades, a leading facade specialist, boasts a strong team of 500+ members, with over 10 years of experience and 5,00,000+ sq.m. of facade works completed. Sapa BS India Pvt Ltd was proud to collaborate with Glazium Facades Pvt Ltd with Technal Systems for this iconic project.

For more information about innovative windows, door and facade solutions please visit www.technal.in

A Cursory Glance!

Biltrax enables sales, marketing and business development teams of construction material manufacturers, distributors, turnkey and trade contractors, and project management consultants with growth opportunities. Biltrax Media is covering various construction technology innovations happening across the world and their application to Indian scenario.

This issue focuses on sustainability and the need for sustainable materials in the construction industry. The issue features thought leaders of the construction and architecture fraternity that have consistently focused on sustainability, highlighting their notable projects, design principles and future trajectories. The project and profile articles along with the client features in this collection embodies conversations with influential names in the Indian construction and design sectors and some remarkable projects of India by globally known Indian Architects that celebrate sustainable design in it's true sense.

Meet the Team!

Ar. Neha Tambe is a passionate and driven conservation architect and urban planner focused on urban conservation. With a unique balance of work experience both in the fields of conservation and urban planning, she brings together an interesting set of skills that are highly relevant and yet hard to find. Currently she heads the Marketing, Communications and PR at Biltrax Construction Data and is the Associate Editor at Biltrax Media.

Ar. Shriya Goyal is an architect with a passion and flair for writing. With experience in architectural practice, she is aware of the ins and outs of design. Her zest for writing and communication has led her to crafting curated articles, interviewing esteemed architects and giving words to built forms all around. She is also our resident graphic designer.

Ar. Sakshi Agrawal is an architect hovering along the edge of multiple design disciplines like interior design, architecture, design writing, and research and interlinking them. Architecture to her is a medium to shift dreams to reality. With an architect's eye and a writer's mind, she aspires to pen down the narrative every structure beholds.

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www.biltrax.com
Data
Insights
Analytics

Biltrax Construction Data is tracking 17,000+ similar projects on their technology platform.

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