



Mivan Technology

Kaivan Kazerouni - Assistant Vice President - Projects, Avighna India Ltd.

MIVAN Formwork Technology is a revolutionary aluminium formwork construction system, which has been successfully used and developed over 20 years, for forming cast-in place reinforced concrete building structures. Using this unique system, all walls, floor slabs, columns, beams, stairs, balconies, together with door and window openings are cast in place in a single site based operation. The resulting building structure is very strong, accurate in dimensions and tolerances, with a high quality of finished concrete surface, and yet at the same time, the MIVAN Formwork Technology is fast, adaptable and very cost effective.



Mivan is an aluminium formwork system used widely in the construction of residential units and mass housing projects. It is fast, simple, adaptable, durable and cost-effective, produces total quality work which requires minimum maintenance. This system is most suitable for Indian condition as a tailor-made aluminum formwork for cast-in-situ fully concrete structure.

MIVAN Formwork can be used for a broad range of applications, from straightforward wall and slab construction to more complicated structures involving bay windows, stairs and A/C hoods. The MIVAN System for forming concrete structures is probably the most versatile modern construction system and unlike other systems, it is equally suited to both high and low rise construction. By using specially designed and manufactured Aluminium Formwork and effectively managing associated construction activities, MIVAN has virtually brought 'assembly line' productivity to the construction site environment, completing projects in record times with four day per floor construction work cycles.

TABLE BELOW GIVES A RELATIVE COMPARISON OF IN-SITU "ALUMINIUM FORM" SYSTEM WITH CONVENTIONAL CONSTRUCTION

Sr. No	Factor	Conventional	In - Situ Aluminium Form System	Remarks
1	Quality	Normal	Superior. In-Situ casting of whole structure and transverse walls done in a continuous operation, using controlled concrete mixers obtained from central batching, mixing plants and mechanically placed through concrete buckets using crane and compacted in leak proof moulds using high frequency vibrators	Superior quality in "System housing".
2	Speed of construction	The pace of construction is slow due to step - by - step completion of different stages of activity the masonry is required to be laid brick by brick. Erection of formwork, concreting and deshuttering forms is a two - week cycle. The plastering and other finishing activities can commence only thereafter.	The walls and floors are cast together in one continuous operation in matter of few hours and in-built accelerated curing overnight enable removal and re-use of forms on daily cycle basis.	System construction is much faster.
3	Aesthetics	In the case of RCC structural framework of column and beams with partition brick walls is used for construction, the columns and beams show unsightly projections in room interiors.	The room-sized wall panels and the ceiling elements cast against steel plates have smooth finishing and the interiors have neat and clean lines without unsightly projections in various corners. The walls and ceilings also have smooth even surfaces, which only need colour/white wash.	
4	External finishes.	Cement plastered brickwork, painted with cement - based paint. Finishing needs painting every in three years.	Textured / pattern coloured concrete facia can be provided. This will need no frequent repainting.	Permanent facia finishes feasible with minor extra initial cost.
5	Useful carpet area as per percentage of plinth area	Efficiency around 83.5 per cent	Efficiency around 87.5 per cent	More efficient utilization of land for useful living space
6	Consumption of basic raw materials			
	a.Cement	Normal	Consumption somewhat more than that used in conventional structures.	Although greater consumption strength and durability is also more
	b.Reinforcing Steel	Reinforcing steel required is less as compared to the in situ construction as RCC framework uses brick wall as alternative	Will be slightly more than corresponding load-bearing brick wall construction for which, requirements of IS 456 have to be followed for system housing.	Steel requirement is more, as it is required for the shear wall construction. But shear wall construction increases safety against earthquake.
7	Maintenance	In maintenance cost, the major expenditure is involved due to: Repairs and maintenance of plaster of walls / ceiling etc. Painting of outer and inner walls. Leakages due to plumbing and sanitation installation.	The walls and ceiling being smooth and high quality concrete repairs for plastering and leakage's are not at all required frequently.	It can be concluded that maintenance cost is negligible.

The main characteristic of the MIVAN Formwork Technology is that it makes use of concrete as the principal building material for the prime reasons of cost and accessibility: Cement, sand and stone are readily available in most countries. Concrete also brings additional benefits in terms of its build quality and strength, its resistance to earthquake tremors, its resistance to fire, rot and vermin



attack; it's low noise transmission with good thermal capacity and it's proven durability, giving long life, with little maintenance.

Advantages of Aluminium Framework over Conventional Construction

1. More seismic resistance: The box type construction provides more seismic resistance to the structure.
2. Increased durability: The durability of a complete concrete structure is more than conventional brickbat masonry.
3. Lesser number of joints thereby reducing the leakages and enhancing the durability.
4. Higher carpet area, due to shear walls. The walls are thin thus increasing area.
5. Integral and smooth finishing of wall and slab - smooth finish of aluminium can be seen vividly on walls.
6. Uniform quality of construction - uniform grade of concrete is used.
7. Negligible maintenance - strong built up of concrete needs no maintenance.
8. Faster completion - unsurpassed construction speed can be achieved due to light weight of forms.
9. Lesser manual labour - less labour is required for carrying formworks.
10. Simplified foundation design due to consistent load distribution.
11. The natural density of concrete wall result in better sound transmission coefficient. ▲



GEAR - UP

TO MAKE YOUR PRESENCE FELT AT THE
Focused Architecture & Design Expo
FOR THE FIRST TIME IN THE HISTORY OF INDIAN ARCHITECTURE

MUMBAI
15th-16th
SEPTEMBER

Hotel Inter Continental - The LALIT,
Mumbai, INDIA.



Highlights:-

TRANSFORMATIONS :-

A UNIQUE THEMATIC ARCHITECTURAL EXHIBITION

NATIONAL CONFERENCE :-

CUTTING EDGE ISSUES ADDRESSED BY CUTTING EDGE SPEAKERS

ACHIEVERS NIGHT :-

A PLATFORM TO HONOR THE LEADING ACHIEVERS OF INDIAN ARCHITECTURE & DESIGN FRATERNITY

IA INDIAN
DF ARCHITECTURAL
DESIGN FESTIVAL
where ARCHITECTS meet ARCHITECTURE

INDIA'S FLAGSHIP EVENT
on
Architecture & Design

For Sponsorships and Conference Details Please Contact :

Rajath.K | Project Group Head | +91 98205 03866 / Kanika. B | Conference co-ordinator | +91 98337 99979
log on to www.iadfest.com or mail us at info@iadfest.com



the living room.

One Avighna Park

Signature Residences, Neo Modern Arch

The structure is designed in a minimalistic style and every external element is a structural member with purpose. The building is comprised of two wings with two separate central core to take lateral loads making the peripheral columns smaller in size. These columns are tied with the central cores with flat plate slab to give maximum flexibility to

the user inside the apartments. There are 4.5-m wide eco decks cantilever from the main structure all around the building, which are supported by floor height RCC fin brackets with square openings. To reduce the wind scoop effect and reduce wind pressure, there are through and through openings in the centre of the building facade.



the bathroom.

MIVAN SYSTEM IN CONSTRUCTION

One Avighna Park has adopted MIVAN System, where all walls, floor slabs, columns, beams, stairs, balconies, together with window and door openings are cast in place, in a single site based operation. By adopting the MIVAN technology, they could reduce the time for structure construction by around eight months. This system gave higher productivity, efficient use of materials, safety, savings in formwork and finishing work, better quality with accurate dimensions and faster construction cycles. Using this technology results in elimination of need to construct column and beams thus casting the walls and slab in one operation, which gives smooth monolithic finish to the structure.

This integrated use of the technology results in a durable structure and eliminates the need for external and internal plaster, as a result the walls can be directly painted with a minimal skim coat, all these ultimately resulting in cost saving.

The technology is environment-friendly as there is no use of timber. The formwork gives the box or cellular design resulting in the walls giving support to the super structure in two directions. As a result, the structures are more resistant to earthquakes than the traditional RCC column and beam designs. As MIVAN Formwork is lightweight, no tower cranes are required for the same unlike in tunnel framework. Due to simplicity of the assembly, only unskilled labourers are required with minimal supervision.

With MIVAN system, they will achieve four to five day slab cycle as against 14 to 20 days by conventional method. As under is the work cycle



the bedroom.

for One Avighna Park to achieve speed, strength, and safety in construction:

WORK CYCLE

- Day 1 - Erection of vertical reinforcement bars and one side of vertical formwork
- Day 2 - Erection of 2nd side of vertical formwork and formwork slab
- Day 3 - Fixing of reinforcement bars for slabs and conduit works
- Day 4 - Casting of walls and slabs
- Day 5 - Removal of vertical formwork

WATER CONSERVATION

City receives ample rains each year and One Avighna Park has tapped into this with strategic rainwater harvesting initiative. In addition, recycled water is treated and used for residents wherever appropriate for flushing and watering gardens.

WASTE MANAGEMENT

The sewage plant in apartment complex takes care of the management of waste efficiently, which further generates the organic fertilizer for gardens, which is offered with each apartment. Garbage chutes are provided near elevators with special chutes for dry wet and recyclable garbage honouring the environmentally friendly principles of garbage separation. The chutes lead to the garbage room all the way down in the basement

so one never have to hold your breath. Each parking lot system is provided with drainage system so after the cars have been washed, the parking lot stays dry.

ENERGY EFFICIENCY

Common areas like entrance lobby are designed to receive natural light so do most part of the apartments. Since soaring temperatures are not always welcome, gardens and heat resistant materials, tall trees are used to keep every apartment cooler. Factors like the direction of wind and air flow are well thought-of for residents to enjoy natural ventilation, while non-smoking areas and usage of low emission materials are also used to decrease carbon foot print. Stringent environmental norms have been adhered to for using eco friendly materials and stock piling top soil to prevent soil erosion.

ECO-FRIENDLY LIGHTING

Combining reliability with sensibility, these apartments' complex with high IQ levels offers an unmatched residential experience with features as effective as they are intelligent. Special eco-friendly LED lightings have been used to sparkle the apartments. There has also been use of solar panels; the energy generated through this will be used for lighting in common areas. ▲

WSP Cantor Seinuk, USA - Structural consultant have vast experience in designing high rise structures internationally, have done One Avighna Park's structural design based on various data such as geological information, wind tunnel analysis, seismic zone, etc. WSP Principally did the concept, schematic and design development along with local consultant Mahimtura structural consultant. Structure is designed for basement, ground floor, 9 podium, 1 service floor, and 54 residential floors. Structure comprises of raft foundation for core shear wall and isolated footings for columns. The structure is based on flat slab concept.

BMT Fluid Mechanics, UK - Wind Tunnel consultant, conducted the wind tunnel analysis by preparing virtual to the scale model of the region. Structure is designed for wind load and earthquake resistance, the height of the structure is approximately 250-m. Rock anchors are provided at the foundation level especially for the core shear walls to counter wind load effect. At the junction of the two towers wind tunnel openings are provided to reduce the overall wind pressure on the structure.

Elmec Electrical Contracting Co, UAE - MEP (Mechanical Electrical & Plumbing), have designed for HVAC, fire fighting, plumbing, drainage, power supply and IBMS (Intelligent Building Management System). IBMS covers synchronization of water supply, fire fighting system, fire alarm system, data, voice and internet connectivity, external façade, lighting control, vertical transport system, DTH television, public address system/ intercom system, CCTV, surveillance and security of entire premises. It is essential to conserve water and so at One Avighna Park, they are recycling water using a STP plant, doing rainwater harvesting, using water from bore wells. Moreover, paying attention to details such as providing natural ventilation and light to common areas so that lights and air conditioning is not on 24/7. It has created different spaces for the residents which revolve around their own core philosophy. It has taken into consideration energy consumption and used latest technology to reduce utility bills. All appliances used or installed have Energy Star ratings as they consume less energy. They have used green principles like water harvesting and solid waste management in their projects.

fact file:

project	: One Avighna Park Signature Residences
developer	: Avighna India Ltd
location	: Lower Parel, Mumbai
design architects	: Neo Modern Arch
structural consultant	: WSP Cantor Seinuk, USA
civil & allied work	: Simplex infrastructure
dt of commencement	: July 2010
dt of completion	: Dec 2012 - Main structure, May 2013 - Hand over
cost	: 700-crore
area	: 3-acres

Advanced construction technology, eco-awareness, superior luxury are the core components of One Avighna Park. The ₹4,000-crore project under the banner of Avighna India encompassing seven acres will include a 64-storeyed luxury residential project, a 42-storeyed commercial tower, a 33-storeyed 5-star hotel and a seven 23-storeyed rehabilitation towers. One Avighna Park received the state approval for the city's first cluster redevelopment scheme by the governor of Mumbai. Offering 9 floors of podium parking with a capacity of 2,200 cars, 1 lakh sq ft of open space with a jogging track, swimming pool and a health club along with a sewage and water treatment plant for its 64-storey project, the project focuses on innovative luxurious development experience blending personal preferences with attentive and uncomplicated lifestyle. Their eco-friendly practices have earned a **Platinum Pre-Certification** under IGBC Green Homes rating system. Not only would the residents have the advantage of energy savings but may get an incentive of 50 per cent on property tax as proposed by Municipality to incentivize Green projects. Special attention has been paid to minute details when designing plans to ensure that people who occupy the space at the end are able to use it as intended. Special thought has gone into the layout of the apartments right from cross ventilation that leads to a healthier lifestyle, to the room size and most importantly from 'affordable maintenance cost' point of view.