

# Composite Panelizing OSC Technology

KOLON Global – KOLON E&C – AXIA Materials



Apr 2025

# 01\_KOLON Prefab Construction Technology

## Introduction of KOLON Prefab System



Prefabrication construction involves assembling factory-produced exterior panels on-site, allowing for quick and efficient construction of complex buildings. This method provides significant advantages in terms of design flexibility and structural efficiency, especially for mid-rise buildings.

### 01 Rapid & Cost Savings

- **Reduction of Labor Costs**  
Significant reduction in labor costs by assembling exterior panels produced in the factory at the construction site.
- **Shortening Construction Period**  
Drastically shorten construction period by minimizing on-site tasks.
- **Effective Use of Lightweight Panels and Improved Efficiency**  
Facilitate transportation and installation, leading to reduced labor and costs.
- **Minimization of Errors**  
Reduction in errors and costs through the use of 2D materials instead of 3D volume.

### 02 Ensuring Design Flexibility and Livability

- **High-Level Design Flexibility**  
Offers significant flexibility in design and floor plan configuration.
- **Minimization of Connection Points**  
Reduce connection points through the application of exterior panels.
- **Structural Stability and Livability**  
Ensure structural stability and basic waterproofing by utilizing large panel applications.
- **Lightweight Structure and Expandability**  
Guarantee structural stability and earthquake resistance with lightweight structures (Mega Structure) and application of lightweight frameworks.






## Ensuring Residential Performance

### 1st grade soundproofing system

#### Soundproof between households

Securing variability and expandability through the application of full drywall  
Reducing the self-weight of the building due to the exclusion of wet construction and lightweight materials

Securing soundproofing and fire resistance  
Optimal system for the required performance

Property		Brick (Masonry)	ALC (Block /Panel)	Gypsum board Drywall	Concrete composite e panel	Extruded Concrete Panels
Construction Method						
Performance	Weight	500	50	60	69	125
	Compress Strength	80	40	220	-	123
	Thermal Transmit	2.06	0.45	0.46	0.54	0.64
Fire resistance		O	O	O	O	O
Sound insulation performance (based on 500Hz)		X (40db)	X (45db)	Class 1 (59db)	Class 2 (54db)	X (47db)
Absorption rate		40	28	10	11	16
Impact resistance		O	O	△	O	O

### Specialized floor heating structure

#### Reduce floor impact noise

Applying the Rahmen structure, 150mm of slab thickness

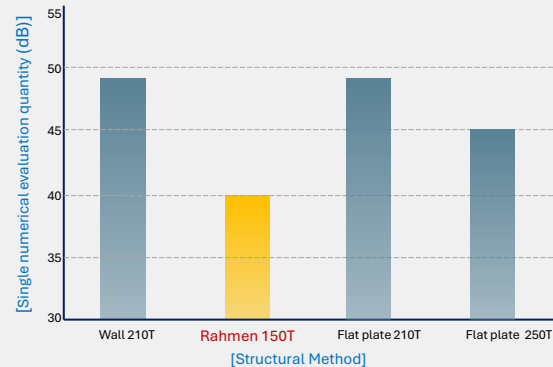
→ Concrete input reduction

Lightweight impact noise reduction 6.4 db  
(compared to wall-type structure)

Heavyweight impact noise reduction  
9.0 db

Max reduction effect with KOLON floor impact noise blocking technology (Patent No. 10-2463319)

#### Weight impact noise test results by structural type (KOLON inhouse test)



### Finishing Integrated External Insulation Method

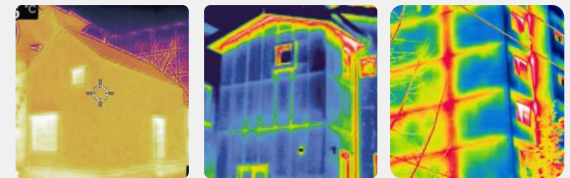
#### Energy efficiency improvement

Minimizing joints through large-area panels, ensuring high airtightness and high insulation  
Minimizing thermal bridges through prefabricated external insulation method  
→ Improving energy efficiency  
No need for external construction / Preventing safety accidents

#### Minimize joints



#### Minimize the occurrence of thermal bridge



[Lite-Pan External Insulation] [External Insulation] [Internal Insulation]

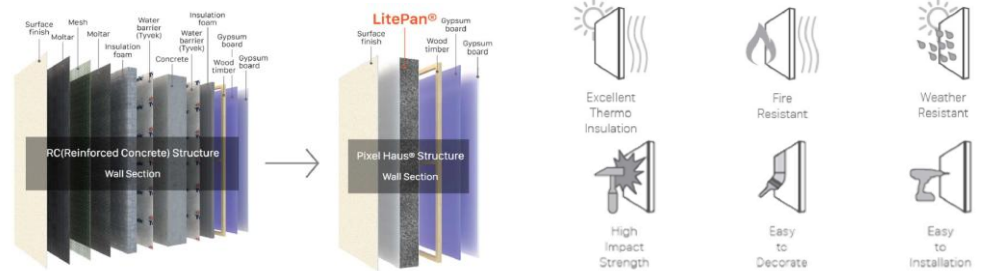
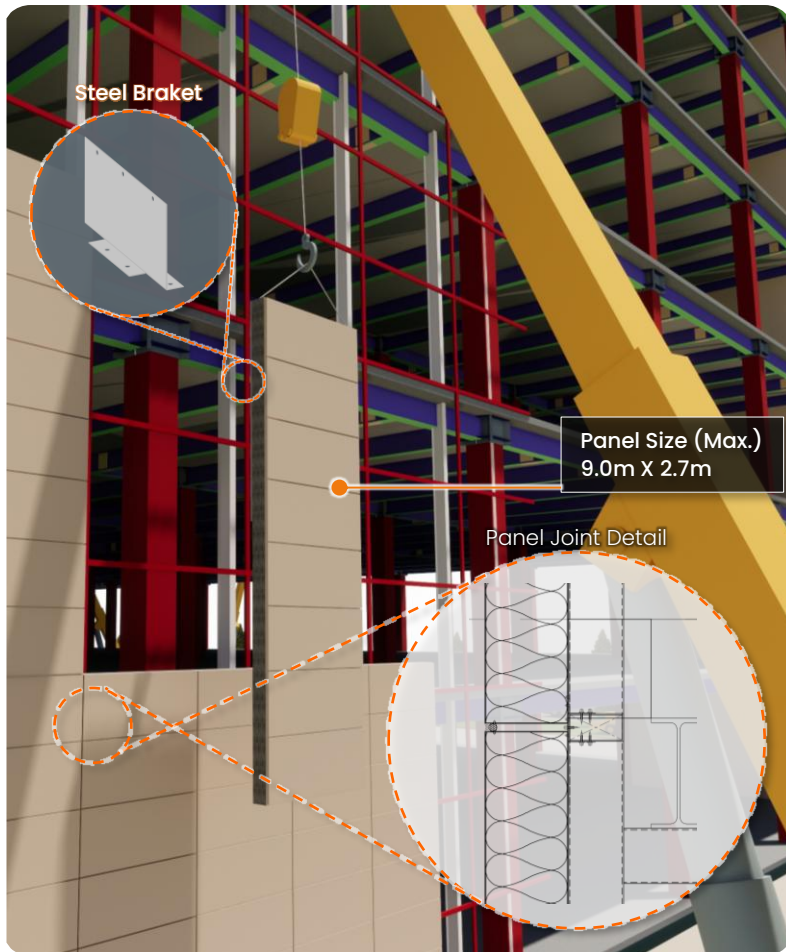
Ensuring energy efficiency and residential performance through optimized prefab construction



## **02\_Composite Panelizing Prefab Construction**

# Composite Panelizing Prefab. Construction

## Large Area External Wall Panelizing



### Large area finish integrated panel (up to 2.7m x 9m)



- **Reducing input materials** by applying complex system panels such as finishing + insulation + structure + facilities
- **Deletion of external work** and **prevent safety accidents** through internal fastening.
- **No construction work required for exterior finish**

### Simplified installation & Reduces work time



- Work with unskilled construction personnel and improve **installation efficiency by simple equipment conclusion**
- **Excellent safety** and construction properties for weather and external work environments
- **Improve loading and transport efficiency** by utilizing 2D members

**Improvement of Construction Efficiency  
by Installing Finishing & Insulating Integrated External Wall Panel**

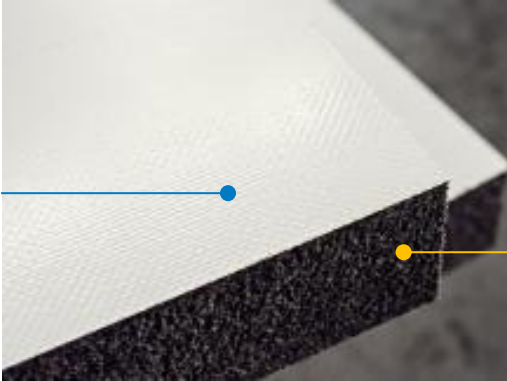
# Composite Panelizing Prefab. Construction

## Composition of LitePan®

**LiteTex**



**LitePan**



Insulation Board



### Surface Material – LiteTex®

- Continuous Fiber Reinforced Composites
- **Very high Tensile Strength** (14~ 16 Mpa)
- Construction standard: G1240WP (Glass Fabric, 0.8t)
- **100% waterproof, anti-corrosion, chemical resistance**
- No dimensional change by weather (thermal stability)
- Eco-friendly: **No VOC** (Volatile Organic Compounds)
- **Semi-noncombustible** certificates (KR Standard)
- **No thermal bridge** construction (Passive House)

### Insulation Core Material

- Thermal Insulation Core: EPS, PIR, PUR, PET, etc
- Thermal Conductivity: 0.031~ 0.036 W/(K·m)
- **Semi-noncombustible** & Flame Retardant
- Less-toxic & eco-friendly than other
- Honeycomb and high-density material for STRUCTURAL application (Truck Deckgate for TATA)
- **Local sourcing available**  
(Manufacture LitePan with LiteTex + local insulation core)

# Composite Panelizing Prefab. Construction

## Key properties of Composite Panel, LitePan®



## MAIN PROPERTIES

- High-tech new construction material (filed at US IBC)
- Multi-functional SIPs (Structural Insulated Panel)
- Large size : one panel with 2.7m x 9.0m, Fast Construction
- Thermal insulation rate by thickness, R value 12 ~ 39
- No thermal bridge and airtightness, Passive-house
- Green material: No Volatile Organic Compounds

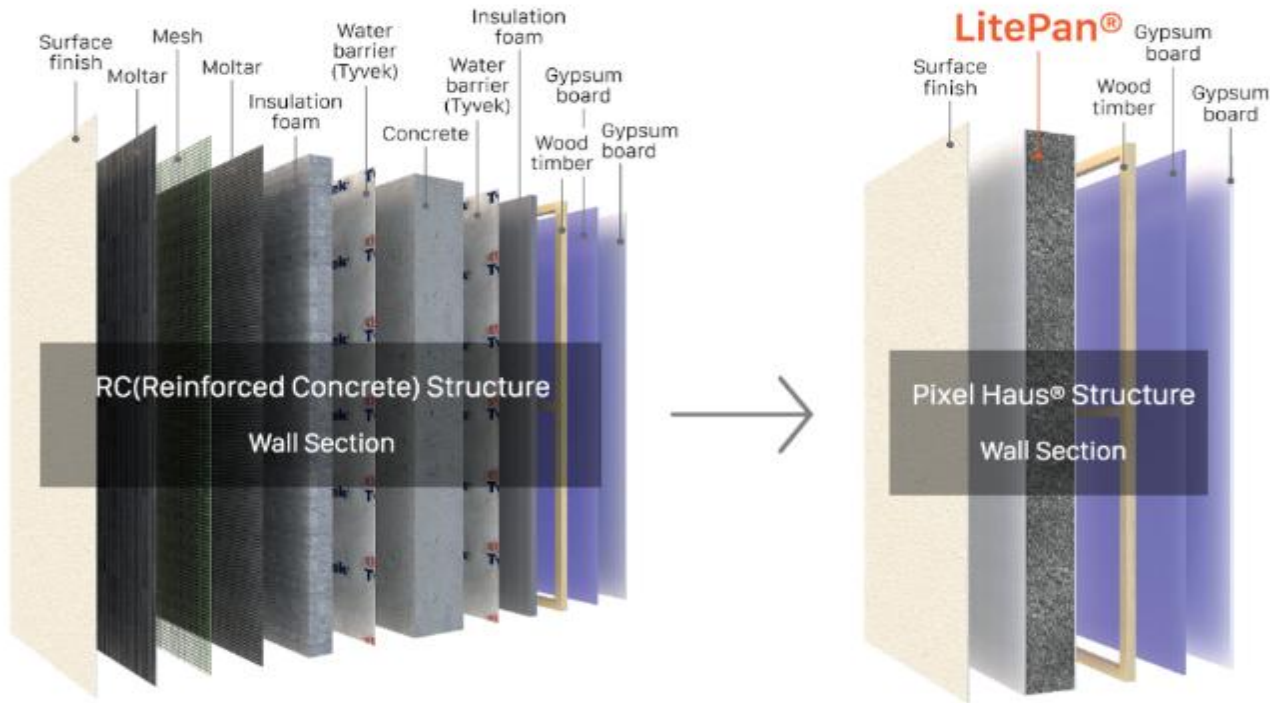


# Composite Panelizing Prefab. Construction

## Key properties of Composite Panel, LitePan®

Simplified wall composition vs conventional walls

Reduced construction period by hand-carry without heavy equipment



**Simplified wall process (7 layer → 3 layer)**



# Composite Panelizing Prefab. Construction

## Composite Panelizing Pre-fab Construction (Eco-Friendly Material, LitePan®)

Less CO<sub>2</sub> and Less Energy consumption

- **29% less GHG (Green House Gas) emission** and **26% less energy resources** required than wood construction



	Wood House	Composite House	Percentage Change
Energy Resources (MJ LHV)	10,900,000	8,120,000	-25.50%
Greenhouse Gases (kg CO <sub>2</sub> )	645,000	460,000	-28.68%
Carcinogens (kg B(a)P)	0.07	0.06	-12.35%
Heavy Metals (kg Pb)	19.30	15.10	-21.76%
Acidification (kg SO <sub>2</sub> )	3,830.00	2,800.00	-26.89%
Eutrophication (kg PO <sub>4</sub> )	808.00	560.00	-30.69%
Ozone Layer (kg CFC11)	0.01	0.01	-25.00%

CEE 226, LIFE CYCLE ASSESSMENT FOR COMPLEX SYSTEMS TERM PROJECT IMPACT OF COMPOSITE MATERIALS ON CONVENTIONAL SINGLE-FAMILY HOUSING. Dec 2017 by MIT University

### ZERO VOC Emission – Eco-friendly Green Product

- No VOC (Volatile Organic Compounds)
- Test result (TVOC) : No detection
- VOC contains harmful substances such as formaldehyde and acetaldehyde.



REDUCE ENVIRONMENTAL IMPACT AND WASTE



REDUCE CONSTRUCTION TIME



IMPROVE EFFICIENCY AND DURABILITY

ADVANTAGES OF COMPOSITE MATERIALS:



> **STRENGTH**  
**WEIGHT**

THAN CONVENTIONAL BUILDING MATERIALS.



RAPID EXPANSION OF COMPOSITE INDUSTRY LEADING TO LOWER PROJECTED COSTS.



POTENTIAL FOR WIDESPREAD REUSE AND RECYCLE OF COMPOSITE WILL REDUCE THE ENVIRONMENTAL IMPACT OF THE INDUSTRY.



ELIMINATION OF WINDOW AND DOOR FRAMES AND MULTI-FUNCTIONAL USE FOR STRUCTURES, WALLS, DOORS AND ROOFS

# Composite Panelizing Prefab. Construction

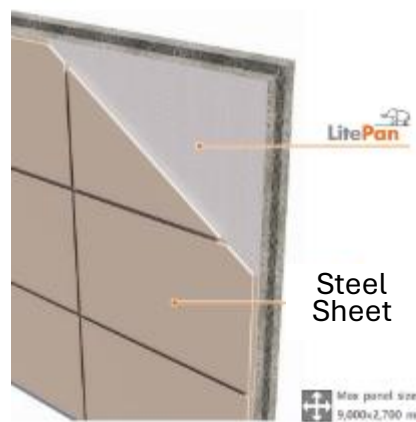
## Fireproof certified LitePan®

[LitePan + Slim Brick] prefabricated from production



	Brick Rail
Width	360 mm
Length	2000mm
Steel Sheet	0.45T Posmac 0.4T AL
Slim Brick	230 x 75 mm, 24T

[LitePan + Steel Sheet] prefabricated from production



## Dry Process

### - Construction :

100% Dry process. Faster construction period and saving labor cost (35% faster). Easy maintenance

### - Weatherability :

Excellent weather resistance against discolor for a long time

### - Thermal Insulation :

Air tightness for no thermal bridge. Higher insulation

### - Aesthetic impression :

Natural color and texture even after long period

## 03\_Panelizing Construction Cases

### Pixel Haus (Non-Structural Tiny House)



## Jeju Island Pension



### Project Description

- 100mm of LitePan was enveloped on CFS(Cold Form Steel) channels.
- Airtight sealing, sea water corrosion resistance was achieved.
- Achieved 3 times faster construction time than conventional way.

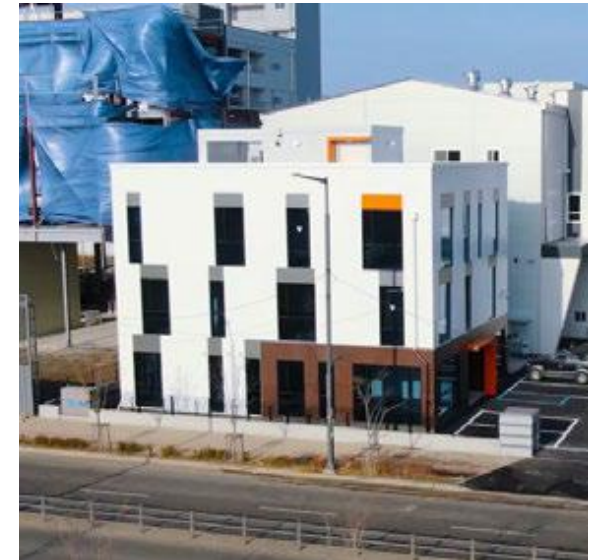


## Atto-metal tech.: office building



### Project Description

- Small Business Facilities Building
- 6 weeks of construction period
- Application of Steel Pipe Tube Embedded Slab
- Full dry construction, no concrete pouring frame



## US Army Beamless Barrack in Kuwait



### Industry News

#### New U.S. Army shelters in Kuwait built with thermoplastic composites

Axia Materials Corp. provided the interior and exterior thermoplastic composite skins.

Author: Heather Coleman, Managing Editor - Electronic Products  
Posted on: 04/02/18  
Source: CompositesWorld

#### Other Project in Kuwait



Technology and Supply Management LLC (TSM), a service-disabled, veteran-owned small business located in Fairfax, VA, has built thermoplastic composite-based energy efficient camps for the U.S. Military in Kuwait. TSM has completed 72 two-story and 26 single-story shelters under an (EPC) contract to provide the U.S. Army with Tactical Energy Efficient shelters for the Kuwait Energy Efficient Project (KEEP) at Camp Buehring, Kuwait. Axia Materials Co. Ltd., Hazeong, South Korea, provided the interior and exterior thermoplastic composite skins. The 72 two-story shelters will house approximately 1,000 soldiers whereas the 26 single-story shelters will house up to 380 additional personnel. The design is structurally independent and features two-room segments with a common layout. The shelters are set up without having any structural frames and is connected only by the composite panels. All exterior walls are ASTM E119. Orders for additional KEEP shelters are planned.

"The Energy Efficient Buildings (EEB) developed as a replacement for the TSM team will provide the war fighters with a sound, energy efficient housing environment that will save the military hundreds of thousands of dollars on the cost of fuel and energy inputs as a replacement to the standard TEMPOR tent over the 15 year warranty life of these shelters," said William Jones, president of TSM.

When the temperature in Kuwait hits 125 degrees Fahrenheit outside, the inside of the buildings without any air conditioning is 78 degrees. "The TSM design emphasizes function over form, with a focus on the Army's objective for a safe, energy efficient, easily assembled and disassembled long-lasting shelter," he said.

"We are so proud of our success in this project as being a selected supplier for this high-end project. We believe our LiteTee thermoplastic composite system will bring new options to building industry with maximizing the energy efficiency, having green property and also achieving economic competitiveness," said Justin Zin, CEO and president of Axia Materials.



### Project Description

- Project "KEEP" (Kuwait Energy Efficiency Project) was built using 100mm LitePan for total 97 barracks
- R-25 insulation with 1 hour fire proof (ASTM E119)
- No structural beam was used: Only LitePan was used

## Yong-in KOLON Prefab Factory (under construction)

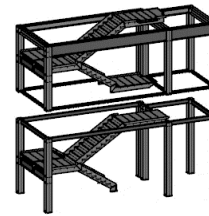


## Project Description

- KG Structure + AXIA LitePan + Stacked Stair Module + System Bath
- Less construction period, not using temporary members
- 30% less bolts than conventional steel beam by applying non-welding joints system
- Floor plate (deck plate) during field work for better safety prevention
- Most of work inside building prevents better fall accidents



## Stacked Stair Unit



Pre-installed module can be the base line for install steel frames (W.P.)

Pre-installed steel stairs can be used as the emergency exit ways

## ACF Cable



Factory pre-manufacturing  
No need of tensile force: guaranteed performance  
ACF fireproof cable satisfying 830°C & 950°C

## System Bath



Factory pre-manufacturing  
Faster install with partially modular system  
Uniform product quality

## National Medical Center negative pressure isolation ward



### Project Description

- 30-bed negative pressure ward (the largest in Korea)
- Construction of a COVID-19 negative pressure treatment ward in the National Medical Center
- Complete construction within 60 days
- Walls and exterior finishes are completed only by panel construction



## Chang-won Highschool External Wall Remodeling




### Project Description

- Thermal insulation reinforcement
- Base Panel    Metal finishing Composites Panel
- Under construction as of Dec 2023


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**THANKS for SHARING  
VISION WITH US!**

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