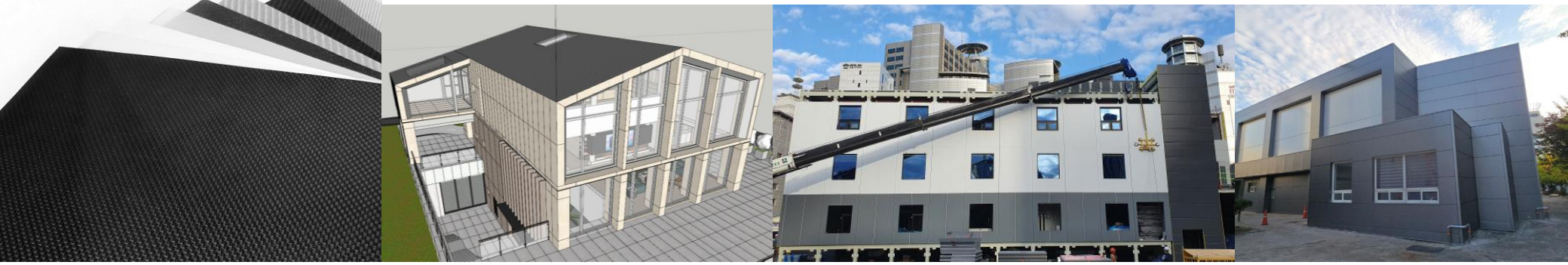
Composite Panelizing OSC Technology

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.

KOLON Prefab. Construction Technology

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 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

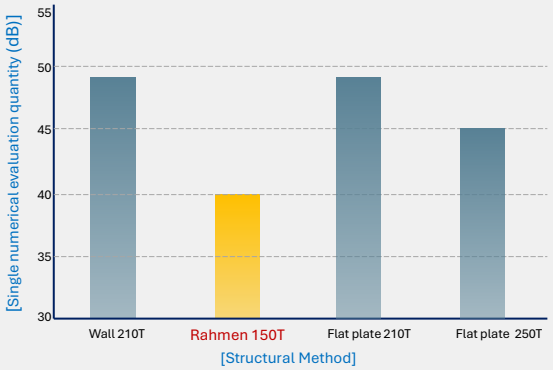
Reduce floor impact noise

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)



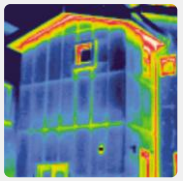
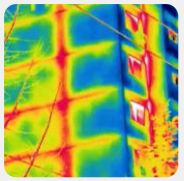
Finishing Integrated External Insulation Method

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

01 KOLON Prefab. Construction Technology

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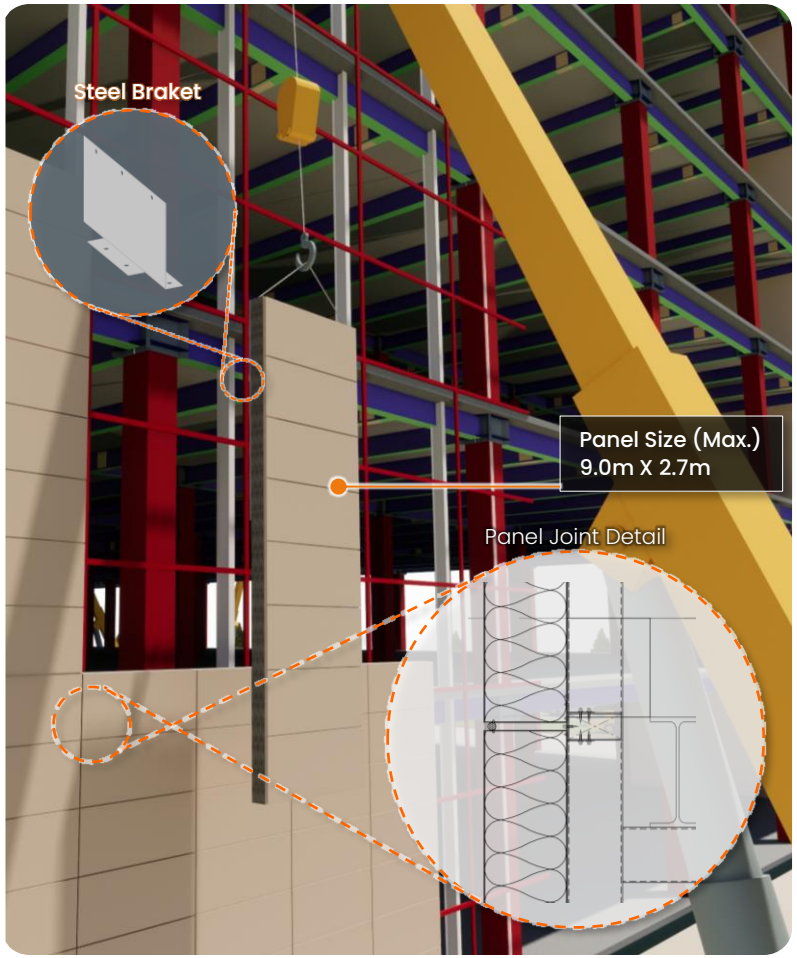
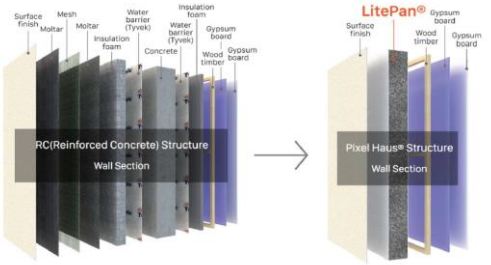
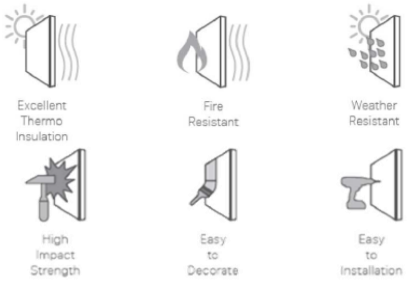
02_Composite Panelizing Prefab Construction

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

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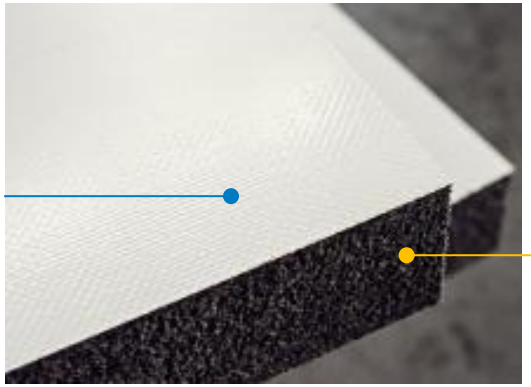
Composite Panelizing Prefab. Construction

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)

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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 aright-tightness, Passive-house
- Green material: No Volatile Organic Compounds

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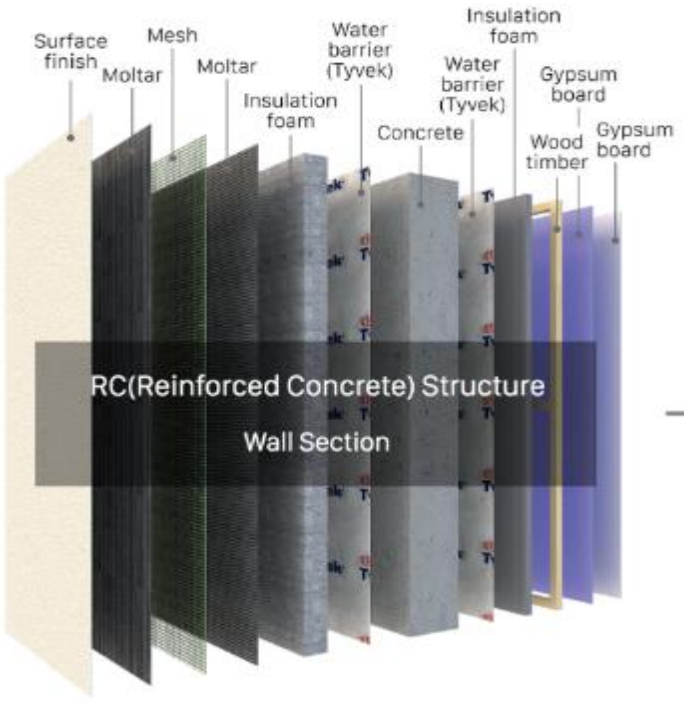
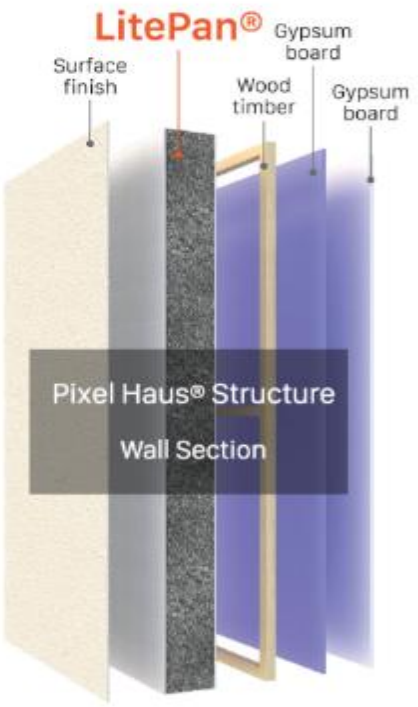
Composite Panelizing Prefab. Construction

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)

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Composite Panelizing Prefab. Construction

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

Less CO_2 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 CO2)	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 SO2)	3,830.00	2,800.00	-26.89%
Eutrophication (kg PO4)	808.00	560.00	-30.69%
Ozone Layer (kg CFC11)	0.01	0.01	-25.00%

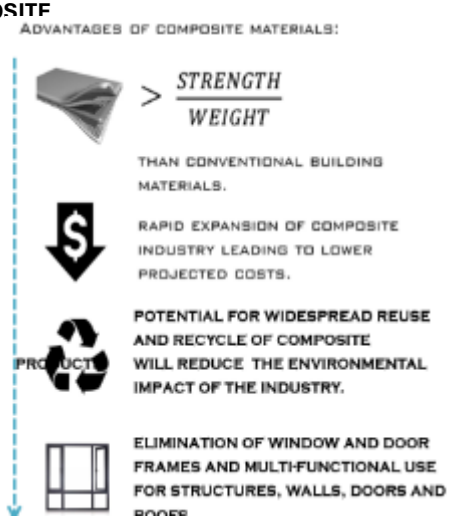
CEE 226, LIFE CYCLE ASSESSMENT FOR COMPLEX SYSTEMSTERM PROJECTIMPACT OF COMPOSITE MATERIALS ON CONVENTIONAL SINGLE-FAMILY HOUSING. Dec 2017 by MIT University

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.



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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

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03_Panelizing Construction Cases

Cases with Prefab. Construction

Pixel Haus (Non-Structural Tiny House)

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Cases with Prefab. Construction

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.

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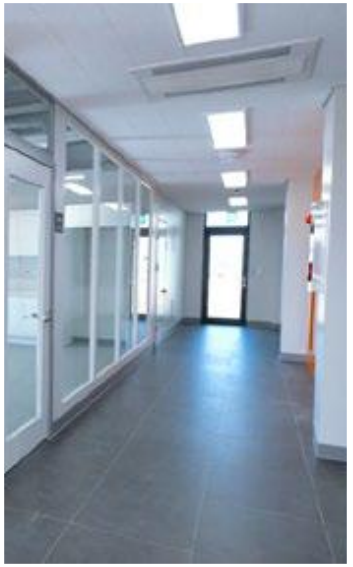
Cases with Prefab. Construction

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

Cases with Prefab. Construction

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.

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

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Cases with Prefab. Construction

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	ACF Cable	System Bath
		
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	Factory pre-manufacturing No need of tensile force: guaranteed performance ACF fireproof cable satisfying 830˚C & 950˚C	Factory pre-manufacturing Faster install with partially modular system Uniform product quality

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Cases with Prefab. Construction

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

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Cases with Prefab. 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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