HOMEQUBE PTE. LTD.

"ONE MILLION HOMES A YEAR"

PROPOSAL FOR SOLVING HOME BUILDING PROBLEMS

TABLE OF CONTENTS

A common home construction material is reinforcing bar. A 400 ft^2 house will need approximately 320 kg of steel, and a conservative estimate of the carbon emissions of steel is around 1.85 kg CO_2 per kg of steel. This results in CO_2 emissions of 592 kg for the theoretical 400 ft^2 house. Although this is a lot smaller contribution compared to the cement, both are used in large amounts worldwide and thus contribute a lot in terms of emissions.

SUMMARY

This whitepaper contains Homeqube's proposal for making a system on how to build one million homes yearly using Homeqube's Legacy Structural Pre-Engineered Buildings (PEB). This system can offer services and opportunities for builders, distributors, fabricators, contractors, designers, and other stakeholders in the field of Architecture, Engineering, and Construction.

With the help of local communities and government, our vision is to implement our system as a solution for Housing issues. Our legacy structural PEB are designed to be resilient against strong wind and earthquakes, cheaper than traditional concrete, and have lesser carbon emissions.

HOUSING ISSUES IN THE PHILIPPINES : SAMPLE PROBLEM

MATERIAL COST

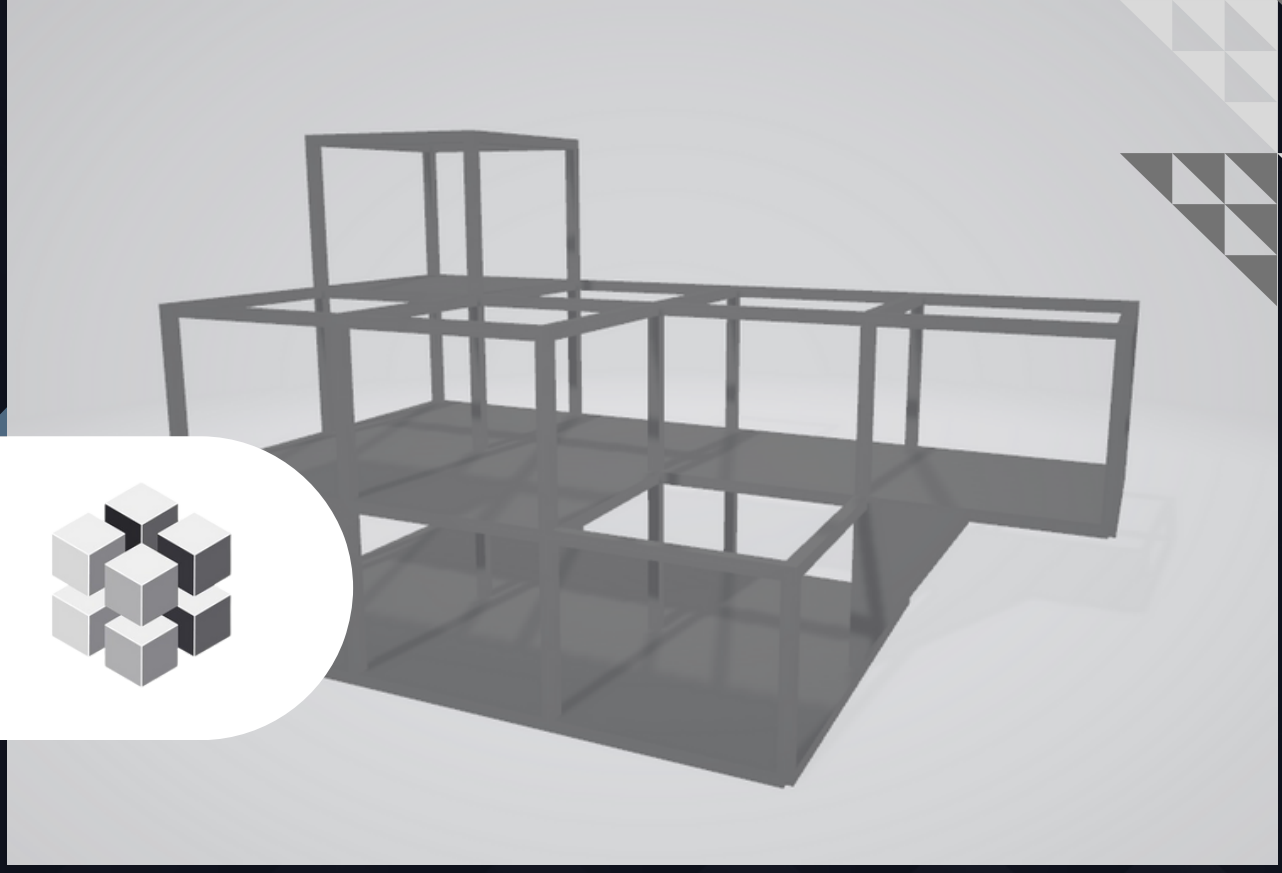
The cost of home construction materials in the Philippines plays a significant role in the overall expense of building a house. Key components such as reinforced concrete, masonry, walls, roofing, and insulation are substantial contributors to this cost. For instance, reinforced concrete costs range from PHP 2,000 to PHP 4,000 per cubic meter. Moreover, expenses for masonry and walls, which include materials like concrete hollow blocks (costing around PHP 12 to PHP 20 per piece), account for approximately 15-20% of the total construction cost. Roofing and insulation materials, vital for the structural integrity and comfort of the house, also add to the expense, with costs ranging from PHP 300 to PHP 1,000 per square meter for common roofing materials. [1]

The finishing style chosen for a house further impacts the overall construction cost. A rough or bare finish, which includes basic structures without elaborate designs, can cost around PHP 20,000 to PHP 25,000 per square meter. In contrast, more sophisticated finishes like the semi-elegant or elegant finishes significantly increase the cost, potentially reaching PHP 40,000 to PHP 50,000 per square meter and above. Additionally, the Construction Materials Wholesale Price Index (CMWPI) in the National Capital Region has shown an increase in the prices of essential construction materials, indicating a rising trend in overall construction costs. [2] [3]

HOUSE PRICING

The Philippines is grappling with a severe housing shortage, with a backlog of approximately 6.5 million units as of 2023. This shortfall is part of a persistent issue, as housing production currently meets only about 17% of the demand. If unaddressed, the housing gap could escalate to 10.9 million units by the end of President Marcos' administration. To mitigate this, the government has launched the "Pambansang Pabahay para sa Pilipino Program" (4PH), aiming to build one million units annually from 2023 to 2028. This program includes various projects, like condominium-type buildings in cities, intended to significantly reduce the housing need. [4] [5]

However, the affordability of these housing solutions remains a significant concern, especially for low-income groups. For instance, a 24-square meter unit under the 4PH program costs approximately ₱1.4 million, a price point beyond reaches for the poorest segments of the population. While the government has proposed subsidies and reduced amortizations, these measures might still be insufficient for those with the lowest incomes. Critics argue that the program seems more suited for the middle class, rather than addressing the needs of the most disadvantaged. [6]



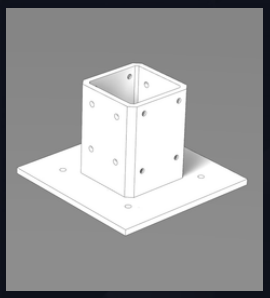
SERVICES OFFERED

ASSEMBLE TO ORDER (ATO): Revolutionizing Production Efficiency

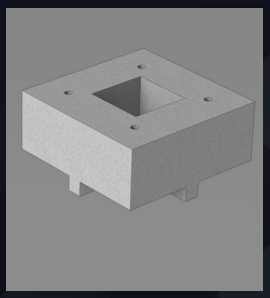
Assemble to Order (ATO) is a modern manufacturing strategy tailored to meet the evolving needs of today's market. It represents a shift from the conventional, forecast-driven production models to a more responsive, customer-centric approach. In an ATO system, the final assembly of a product is not initiated until a customer order is received. This strategy utilizes a robust inventory of standardized components and parts that are quickly and efficiently assembled into a finished product once an order is placed.

Some key benefits of Assemble to Order over Traditional Manufacturing

- Reduced Inventory Cost
- Improved Responsiveness to Market
- Enhanced Quality Controls
- Scalability and Adaptability
- Mass Complexity



BASEPLATE



PEDESTALS

COLUMNS AND BEAMS

CONNECTORS

HOMEQUBE Structural Legacy Parts registered as Industrial Design under the Intellectual Property Offices

OUR OPPORTUNITIES

BE AN INVESTOR AND EARN

Millions of unique designs can be generated from the Structural legacy parts, thus allowing a high level of customization for customers to cater their needs, leading to better profit margin. Less cost is tied to the inventory since home parts components are stocked instead of the finished product. Also, by utilizing ATO scheme, there is a reduced risk of overproduction. These factors combine is potentially lucrative, offering high margins, efficient capital use, and strong growth.

BE A FABRICATOR

Fabricators benefit from ATO scheme through production at actual orders, efficient resource utilization, and flexibility in scaling operations.

Through our Technology Transfer Franchise, you will be participating in our Homqube Ecosystem on making home-building processes accessible to all and to serve humanity's aggregated requirements for long-term sustainability.

PUBLIC-PRIVATE PARTNERSHIP (PPP)

Our proposal can offer several benefits to the government thru a PPP, which includes:

- Innovations for mass house building projects
- Minimization of cost associated with overproduction and inventory management.
- Provide jobs to the community as our assembly methodology requires basic construction skills and not dependent on heavy equipment
- Increase flexibility in terms of design, risk sharing, and housing demands.

ASSEMBLY IN ACTION

IN JUST 14 HOURS, WITH ONLY SIX WORKERS, WE CAN ASSEMBLE THE STRUCTURAL FRAMING OF A TWO STORY HOUSE. THAT IS EQUAL TO **84 MAN HOURS**. CLICK THE IMAGE BELOW FOR THE VIDEO.

The material used for fabricationg the Structural Legacy parts is Homeqube's **Proprietary Glass Fiber Reinforced Polymer (GFRP)** with properties, upon manufacturing, has strengths comparable to traditional to reinforced concrete, but has lesser CO_2 emmissions.

The beams and columns can be created by a Pultrusion Machine, with a production capacity of 115,000 parts/year, equivalent to approximately 2,400 house/year.

To reach the capacity of **one million houses per year**, around **420 pultrusion machines are needed**.

To achieve our goal of building **one million houses annually**, amounting to 84 million man-hours, we require about **40,000 workers**. Our construction approach, designed for easy erection without heavy machinery, significantly lowers costs and construction time. This method not only makes the building process efficient but also generates substantial employment opportunities in local communities. By prioritizing manual labor, we're contributing to both housing and job markets, highlighting our commitment to community development and economic growth.

CONSTRUCTION METHODOLOGY

IN JUST 14 HOURS, WITH ONLY SIX WORKERS, WE CAN ASSEMBLE THE STRUCTURAL FRAMING OF A TWO STORY HOUSE. THAT IS EQUAL TO **84 MAN HOURS**. CLICK THE IMAGE BELOW FOR THE VIDEO.

1. Lay-outing & installation of footing on site

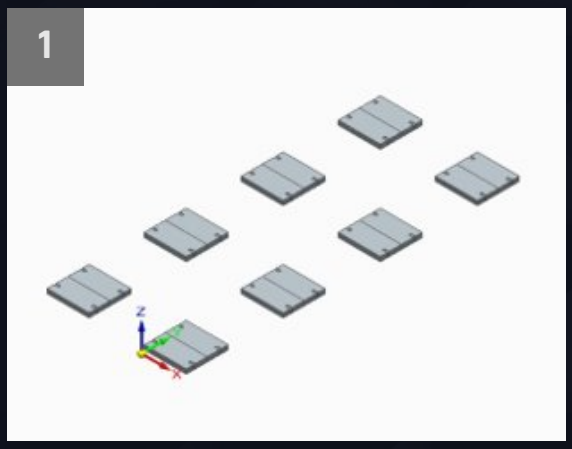
The helical pile's bolt must be stable & and the ground must be fixed before installation of footing. Levelling and layouts based on the plan must conducted using simple tools like lever bar, level host, or laser.

2. Installation of Pedestals on site.

3. Installation of ground floor columns and beams on site

4. Installation of Cantilevers using HQ Pulley System and HQ Scaffolding.

1



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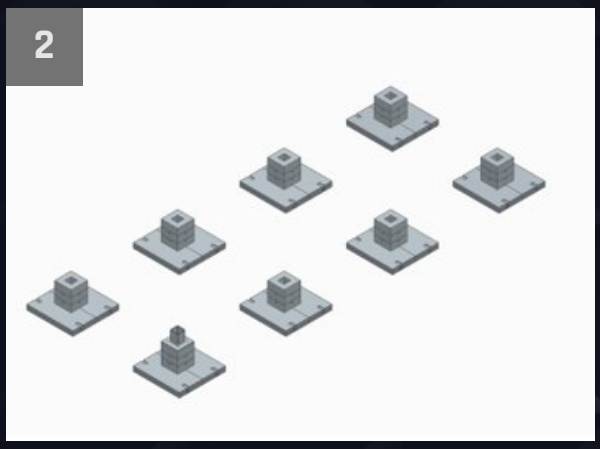

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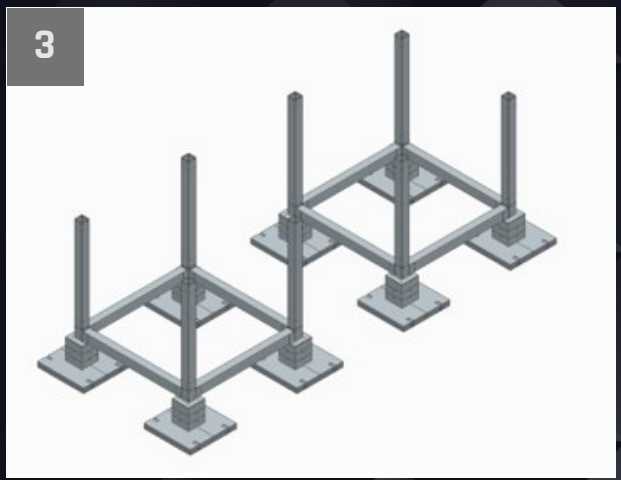

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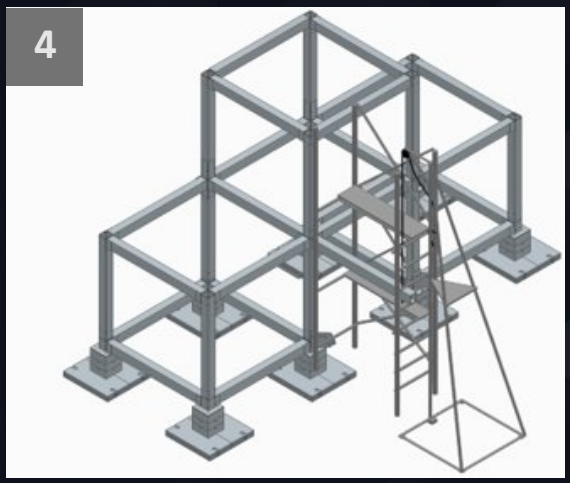
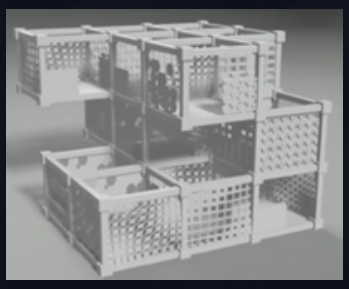
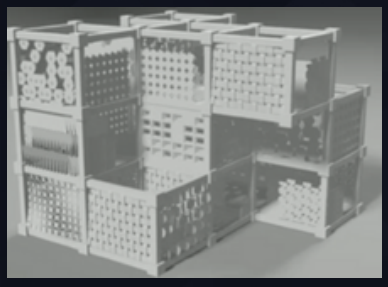


COST OF A HOMEQUBE HOUSE

As the Homeqube Structural Legacy parts allows multiple configurations of arrangements, you can make the most out of this benefit. Aside from the maximum limit of three stories, your limit is your imagination on how you would configured your design.





SAMPLE STRUCTURAL COST

Parts	Cost/Qty (USD)	Qty	Subtotal (USD)
Beam	184.97	28	5,179.26
Column	219.47	14	3,072.58
Diagonal Brace	220	2	440.00
Beam Connector	21.38	56	1,197.30
Column Adoptor	101.57	14	1,421.94
Base Plate	103.16	8	825.29
Diagonal Brace Connector	86.10	1	86.10
Helical Pile	16.21	8	129.66
M10x70 Bolt	3.05	672	2,049.60
Pedestal	34.60	8	276.76
Pizza Footing	27.31	8	218.50
		Total	**14,896.89**

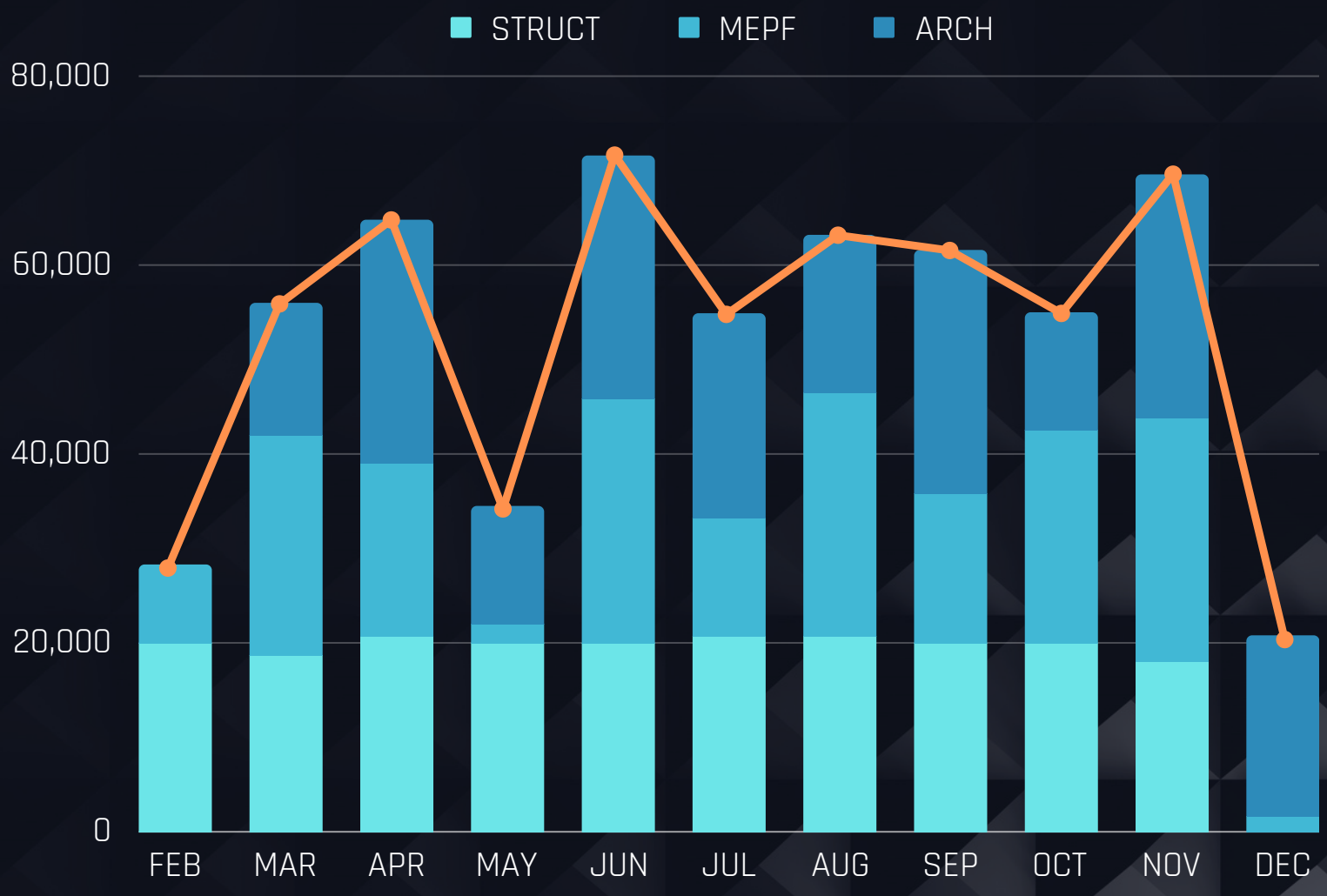
Prototype Details:

1. Four Cube configuration (3 normal, 1 cantilever)
2. Total area = 85.75 m^2
3. Area distribution (m^2)
    a. Parking area - 12.25 m^2
    b. Enclosed area - 49 m^2
    c. Deck area - 24.5 m^2
4. No paint and cement finishes.

SCALING TO A MILLION HOMES

At Homeqube, our vision for maturity encompasses reaching an annual capacity of constructing one million homes. This ambitious goal positions us as a leader in delivering services that are not only rapid and cost-effective but also maintain a high standard of quality for home building. Our approach is designed to effectively tackle the pressing issue of housing shortages, introduce innovative building techniques, and contribute positively to urban planning and development. We are committed to employing sustainable practices and materials in our construction processes, ensuring a reduced environmental footprint and promoting eco-friendly living.

MANPOWER TO BUILD A MILLION HOMES



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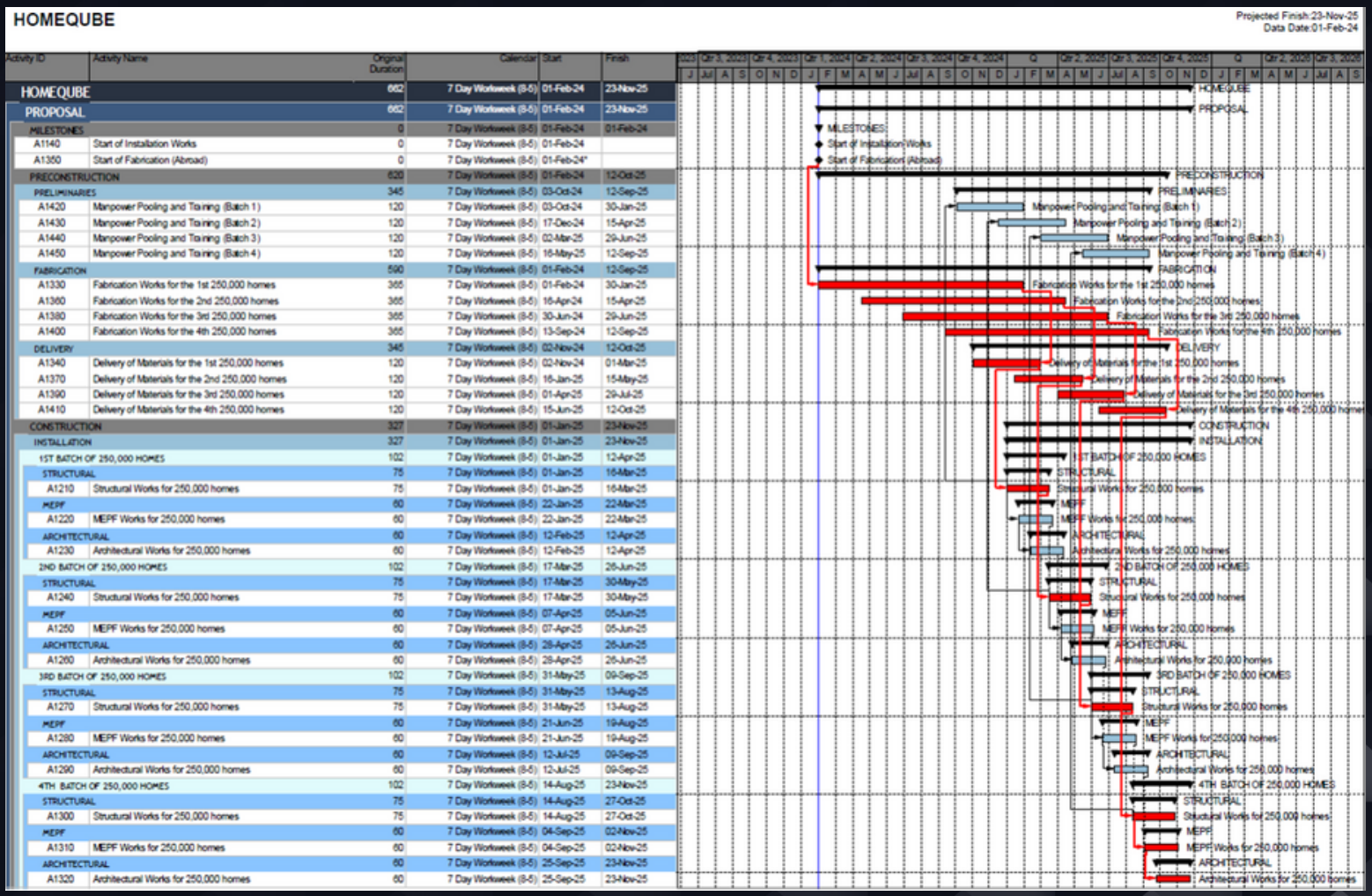
SCHEDULING



HOMEQUBE

Projected Finish:23-Nov-25
Data Date:01-Feb-24

Activity ID	Activity Name	Original Duration	Calendar	Start	Finish
HOMEQUBE		662	7 Day Workweek (8-5)	01-Feb-24	23-Nov-25
PROPOSAL		662	7 Day Workweek (8-5)	01-Feb-24	23-Nov-25
MILESTONES		0	7 Day Workweek (8-5)	01-Feb-24	01-Feb-24
A1140	Start of Installation Works	0	7 Day Workweek (8-5)	01-Feb-24	
A1350	Start of Fabrication (Abroad)	0	7 Day Workweek (8-5)	01-Feb-24*	
PRECONSTRUCTION		620	7 Day Workweek (8-5)	01-Feb-24	12-Oct-25
PRELIMINARIES		345	7 Day Workweek (8-5)	03-Oct-24	12-Sep-25
A1420	Manpower Pooling and Training (Batch 1)	120	7 Day Workweek (8-5)	03-Oct-24	30-Jan-25
A1430	Manpower Pooling and Training (Batch 2)	120	7 Day Workweek (8-5)	17-Dec-24	15-Apr-25
A1440	Manpower Pooling and Training (Batch 3)	120	7 Day Workweek (8-5)	02-Mar-25	29-Jun-25
A1450	Manpower Pooling and Training (Batch 4)	120	7 Day Workweek (8-5)	16-May-25	12-Sep-25
FABRICATION		590	7 Day Workweek (8-5)	01-Feb-24	12-Sep-25
A1330	Fabrication Works for the 1st 250,000 homes	365	7 Day Workweek (8-5)	01-Feb-24	30-Jan-25
A1360	Fabrication Works for the 2nd 250,000 homes	365	7 Day Workweek (8-5)	16-Apr-24	15-Apr-25
A1380	Fabrication Works for the 3rd 250,000 homes	365	7 Day Workweek (8-5)	30-Jun-24	29-Jun-25
A1400	Fabrication Works for the 4th 250,000 homes	365	7 Day Workweek (8-5)	13-Sep-24	12-Sep-25
DELIVERY		345	7 Day Workweek (8-5)	02-Nov-24	12-Oct-25
A1340	Delivery of Materials for the 1st 250,000 homes	120	7 Day Workweek (8-5)	02-Nov-24	01-Mar-25
A1370	Delivery of Materials for the 2nd 250,000 homes	120	7 Day Workweek (8-5)	16-Jan-25	15-May-25
A1390	Delivery of Materials for the 3rd 250,000 homes	120	7 Day Workweek (8-5)	01-Apr-25	29-Jul-25
A1410	Delivery of Materials for the 4th 250,000 homes	120	7 Day Workweek (8-5)	15-Jun-25	12-Oct-25
CONSTRUCTION		327	7 Day Workweek (8-5)	01-Jan-25	23-Nov-25
INSTALLATION		327	7 Day Workweek (8-5)	01-Jan-25	23-Nov-25
1ST BATCH OF 250,000 HOMES		102	7 Day Workweek (8-5)	01-Jan-25	12-Apr-25
STRUCTURAL		75	7 Day Workweek (8-5)	01-Jan-25	16-Mar-25
A1210	Structural Works for 250,000 homes	75	7 Day Workweek (8-5)	01-Jan-25	16-Mar-25
MEPF		60	7 Day Workweek (8-5)	22-Jan-25	22-Mar-25
A1220	MEPF Works for 250,000 homes	60	7 Day Workweek (8-5)	22-Jan-25	22-Mar-25
ARCHITECTURAL		60	7 Day Workweek (8-5)	12-Feb-25	12-Apr-25
A1230	Architectural Works for 250,000 homes	60	7 Day Workweek (8-5)	12-Feb-25	12-Apr-25
2ND BATCH OF 250,000 HOMES		102	7 Day Workweek (8-5)	17-Mar-25	26-Jun-25
STRUCTURAL		75	7 Day Workweek (8-5)	17-Mar-25	30-May-25
A1240	Structural Works for 250,000 homes	75	7 Day Workweek (8-5)	17-Mar-25	30-May-25
MEPF		60	7 Day Workweek (8-5)	07-Apr-25	05-Jun-25
A1250	MEPF Works for 250,000 homes	60	7 Day Workweek (8-5)	07-Apr-25	05-Jun-25
ARCHITECTURAL		60	7 Day Workweek (8-5)	28-Apr-25	26-Jun-25
A1260	Architectural Works for 250,000 homes	60	7 Day Workweek (8-5)	28-Apr-25	26-Jun-25
3RD BATCH OF 250,000 HOMES		102	7 Day Workweek (8-5)	31-May-25	09-Sep-25
STRUCTURAL		75	7 Day Workweek (8-5)	31-May-25	13-Aug-25
A1270	Structural Works for 250,000 homes	75	7 Day Workweek (8-5)	31-May-25	13-Aug-25
MEPF		60	7 Day Workweek (8-5)	21-Jun-25	19-Aug-25
A1280	MEPF Works for 250,000 homes	60	7 Day Workweek (8-5)	21-Jun-25	19-Aug-25
ARCHITECTURAL		60	7 Day Workweek (8-5)	12-Jul-25	09-Sep-25
A1290	Architectural Works for 250,000 homes	60	7 Day Workweek (8-5)	12-Jul-25	09-Sep-25
4TH BATCH OF 250,000 HOMES		102	7 Day Workweek (8-5)	14-Aug-25	23-Nov-25
STRUCTURAL		75	7 Day Workweek (8-5)	14-Aug-25	27-Oct-25
A1300	Structural Works for 250,000 homes	75	7 Day Workweek (8-5)	14-Aug-25	27-Oct-25
MEPF		60	7 Day Workweek (8-5)	04-Sep-25	02-Nov-25
A1310	MEPF Works for 250,000 homes	60	7 Day Workweek (8-5)	04-Sep-25	02-Nov-25
ARCHITECTURAL		60	7 Day Workweek (8-5)	25-Sep-25	23-Nov-25
A1320	Architectural Works for 250,000 homes	60	7 Day Workweek (8-5)	25-Sep-25	23-Nov-25

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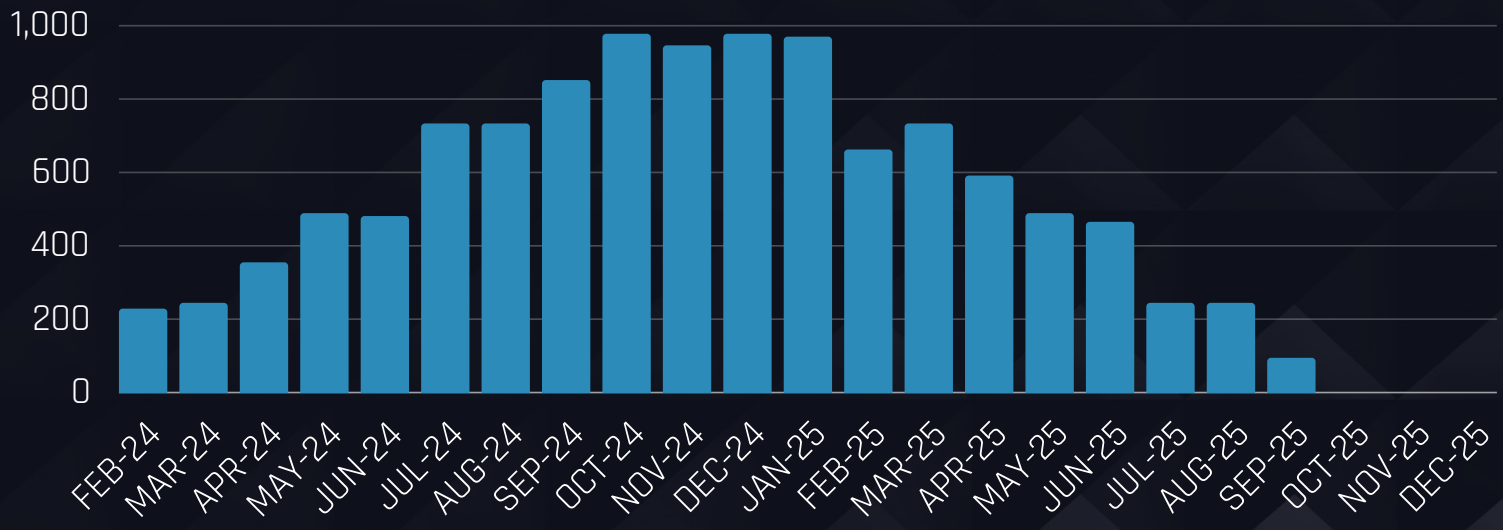
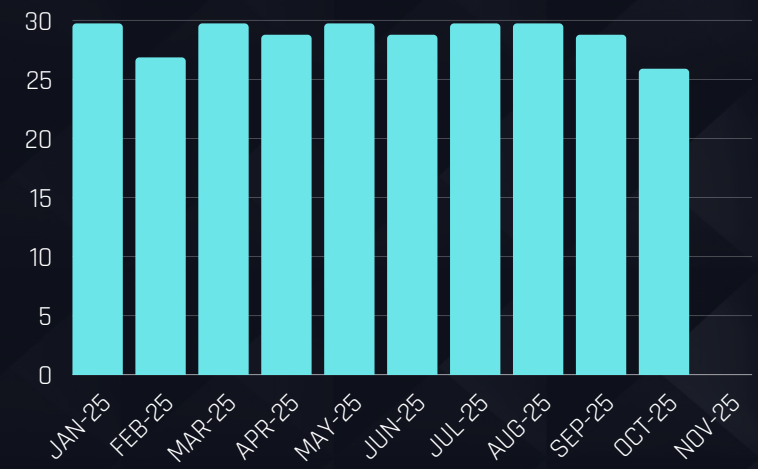
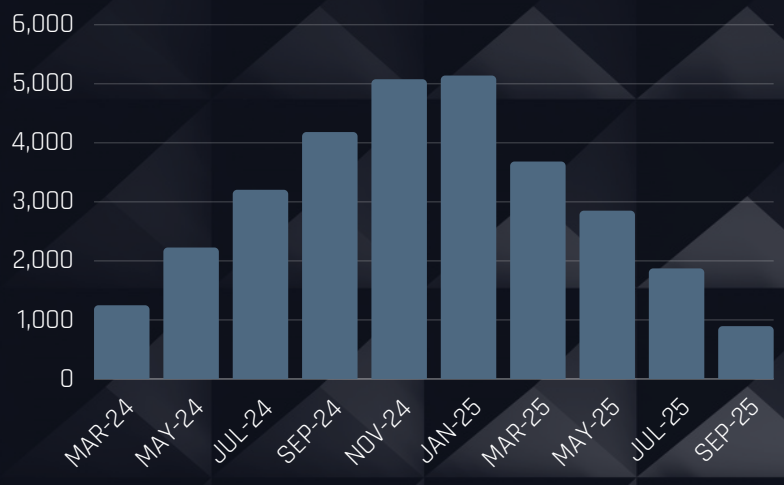
RAW MATERIAL COST (IN MILLIONS OF USD)



DIRECT LABOR COST (IN MILLIONS OF USD)



EQUIPMENT COST (IN THOUSANDS OF USD)



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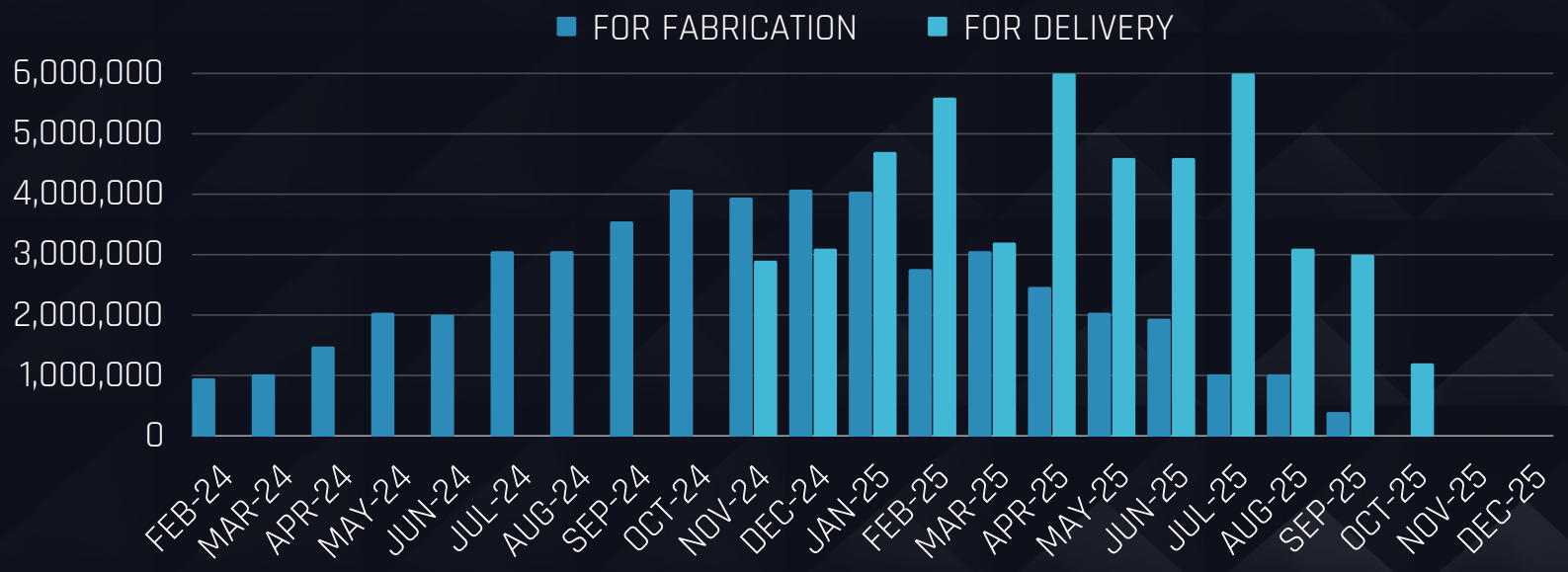
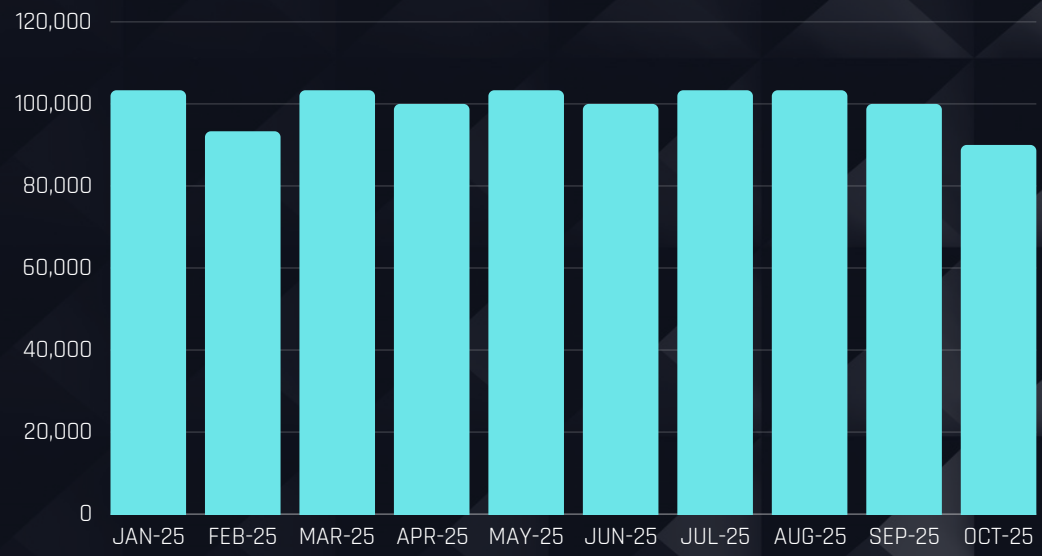
NO. OF HOMEQUBE PARTS



NO. OF ERECTED HOMES (STRUCTURAL)



LIFE CYCLE ASSESSMENT

The use of GFRP results in **avoidance of significant carbon emission** versus reinforced concrete and steel housing. Other benefits from HOMEQUBE's housing are process streamlining and prevention of environmental degradation from raw materials sourcing of cement and steel. A summary of the carbon emissions is placed below:

	HOMEQUBE GFRP	STEEL	CONCRETE
Manufacturing Method	Pultrusion	28	5,179.26
Energy (MJ/kg)	3.10	7.16	0.95
% Waste During Manufacturing	1.40%	4.10%	5.00%
Required Finished Product + Manufacturing Waste	14,119,582 kg	28,825,484 kg	119,814,188 kg
Total Energy required	43,770,704 MJ	206,390,467	113,823,478
Total Energy required in (5/18*Total Energy req'd)	12,158,529 kWh	57,330,685 kWh	31,617,633 kWH
Total Tons of CO2 Emission	4,116	19,408	10,703
Emissions Reduction from Using GFRP	n/a	**78.8%**	**61.5%**

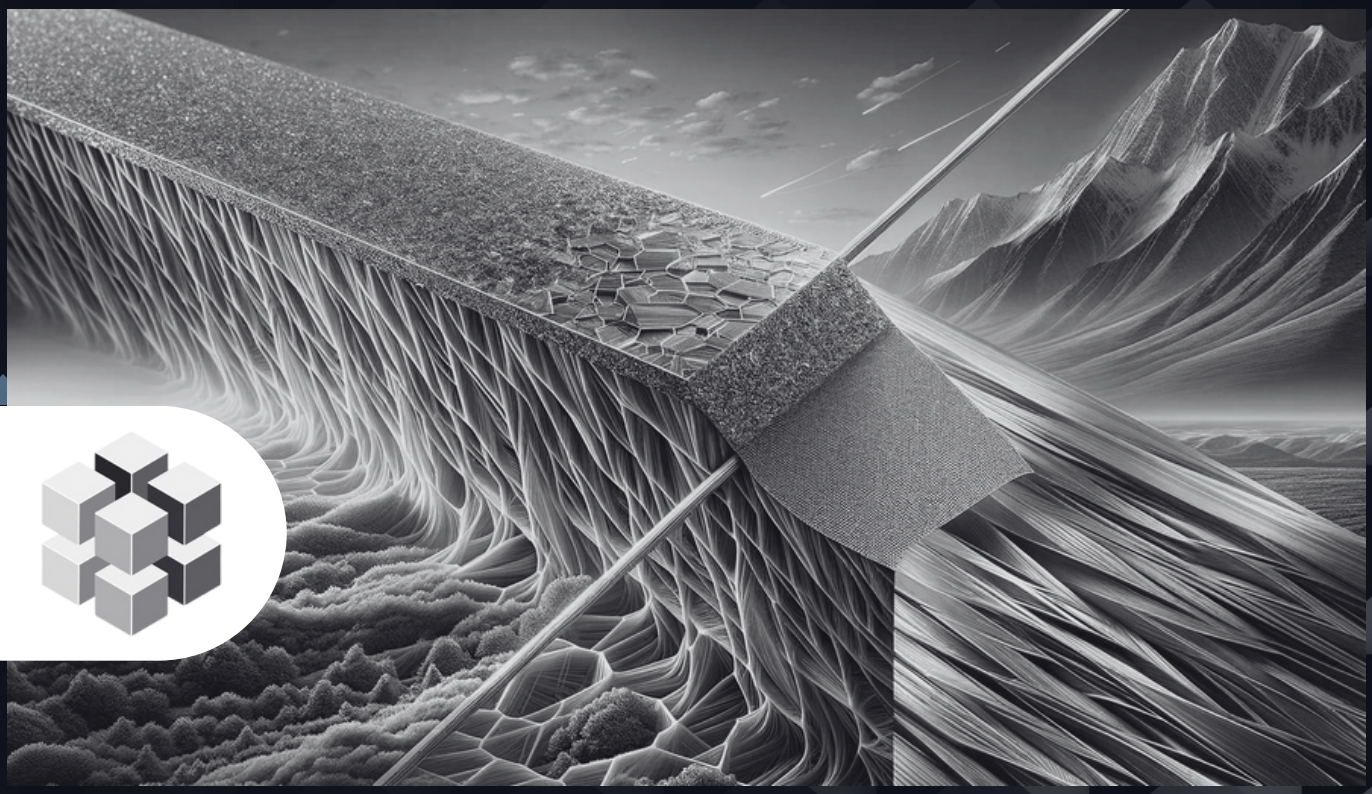
ABOUT
GFRP AND FML

GFRP

Glass Fiber Reinforced Polymer (GFRP) is a composite material made by reinforcing plastic with fine fibers made of glass. This combination results in a strong, durable, and extremely versatile material. In the construction industry, GFRP is highly valued for its strength-to-weight ratio, which is superior to many traditional building materials. It is also resistant to corrosion, moisture, and various chemical impacts, making it ideal for use in harsh or corrosive environments. This material is used by Homeqube in fabricating the Legacy frame parts **(Beams, Columns, Braces).** Its aesthetic qualities also make it a popular choice for architectural applications, where both functionality and visual appeal are important. Additionally, GFRP's thermal properties and resistance to electromagnetic interference are advantageous in certain specialized construction scenarios.

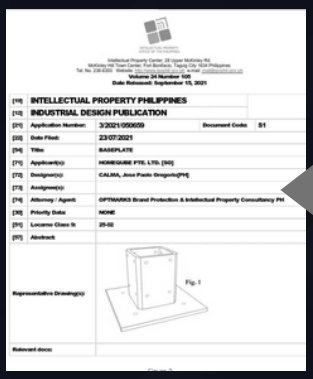
FML

Fiber Metal Laminates (FMLs) are hybrid composites made by layering thin metal sheets and fiber-reinforced polymers. They offer a unique combination of the lightness and strength of both materials, making them ideal for high-stress, lightweight construction applications. Typically involving aluminum or titanium and fibers like glass or carbon, FMLs are produced through a bonding process under heat and pressure. In construction, they're mainly used in aerospace for parts like aircraft fuselage and wings, providing benefits like reduced weight, increased strength, and enhanced fatigue and corrosion resistance. This makes them crucial for designing more efficient, durable structures in sectors where such properties are paramount. This material is used by Homeqube for fabricating our **connectors (Base Plate, Column Adaptor, Beam Connector)**



CERTIFICATIONS

Our Structural Legacy Parts registered as Industrial Design under the Intellectual Property Office of the Philiippines. The parts are also designed and approved by Professional Structural Engineers, certifying the parts are safe and within standards.



BASE PLATE

BEAM

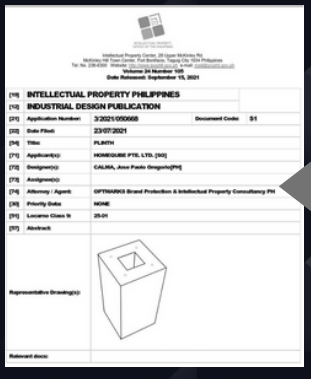
BEAM CONNECTOR

CENTRAL PIN

COLUMN ADAPTOR

COLUMN

ISOLATED FOOTING



PLINTH