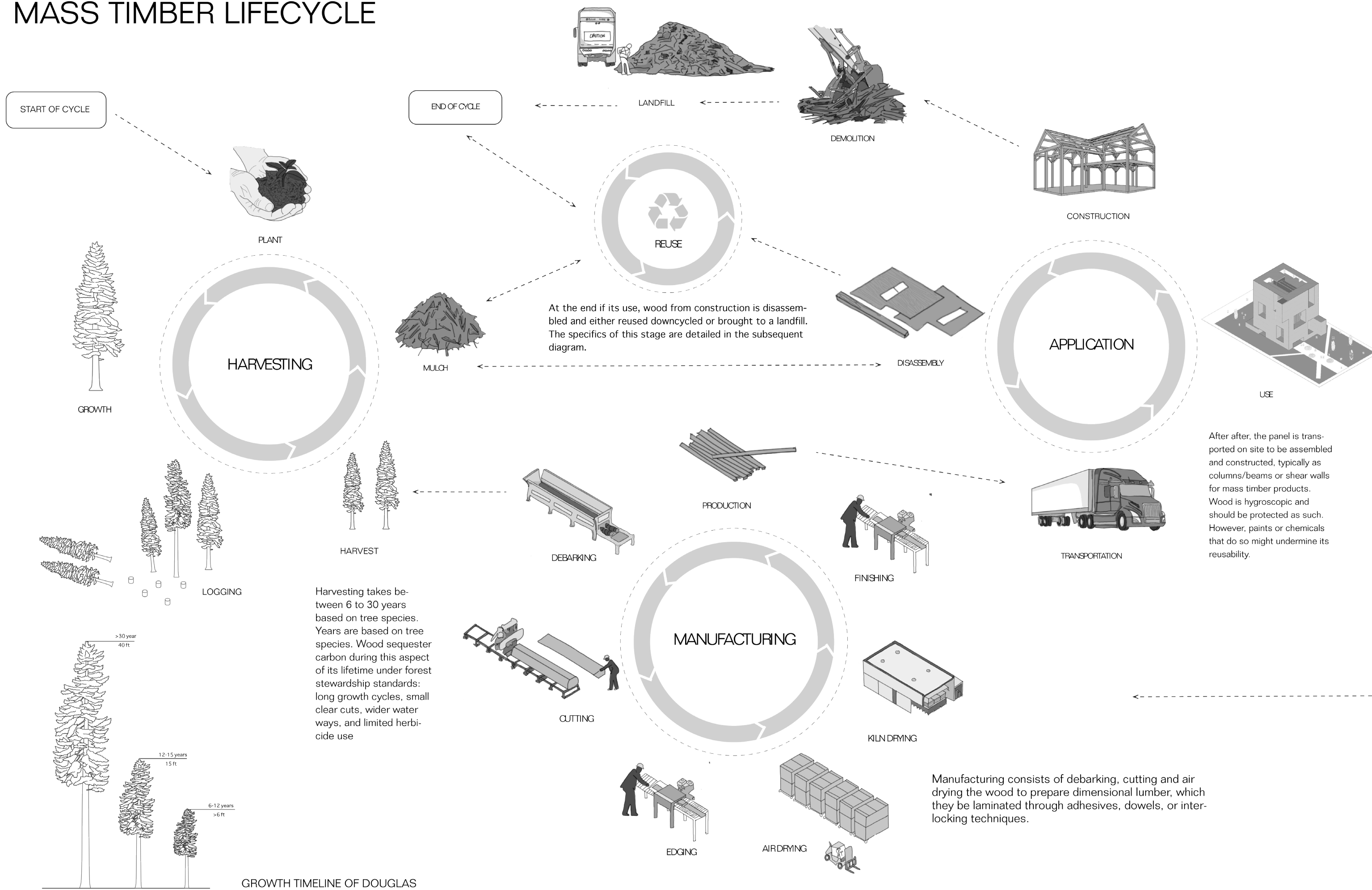


WOOD BASED PRODUCTS



Jebreel Bessiso, Jose Ortega, Ana Samaniego, Isabella Cobo Aguirre

MASS TIMBER LIFECYCLE

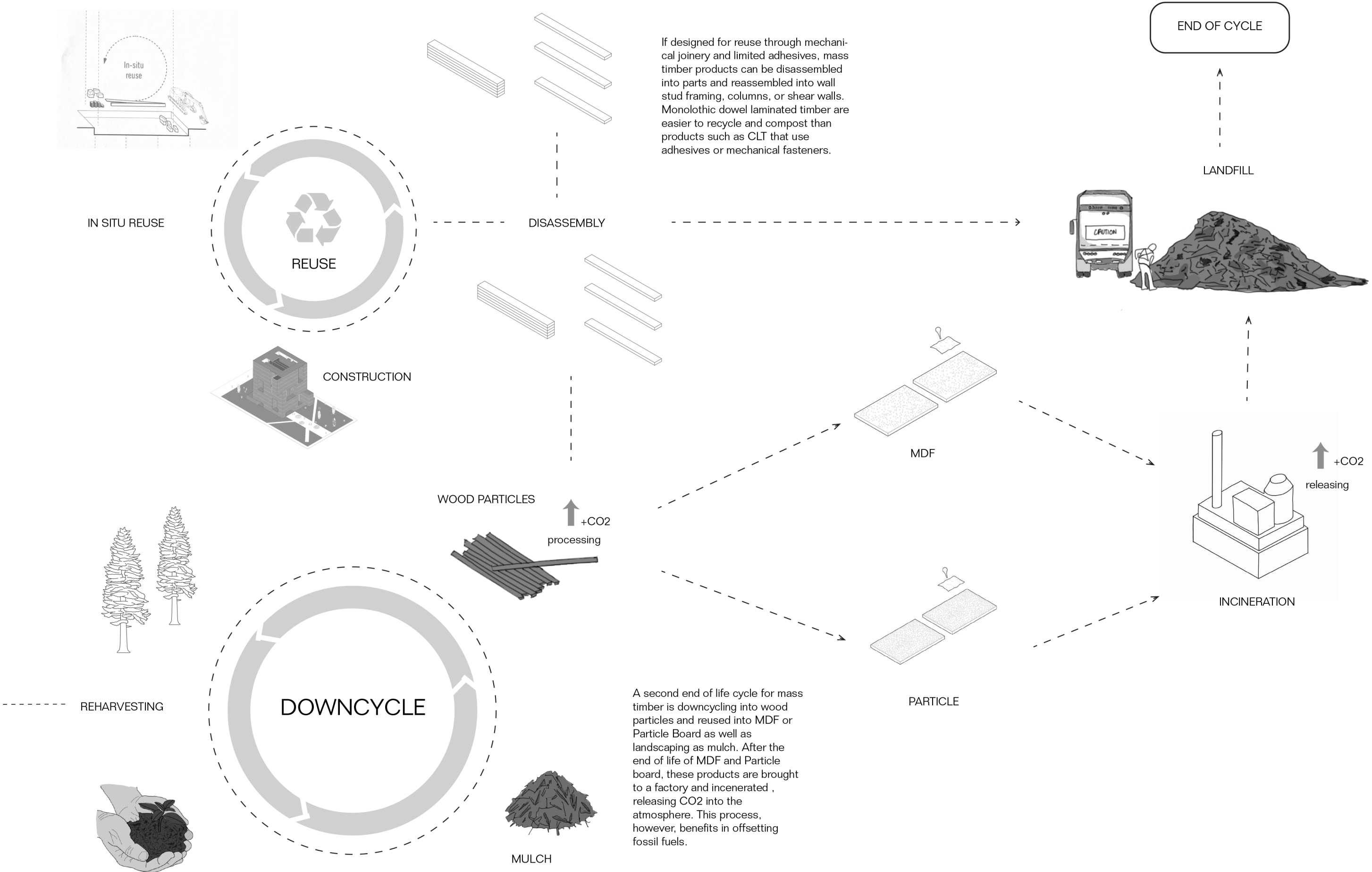


Harvesting takes between 6 to 30 years based on tree species. Years are based on tree species. Wood sequester carbon during this aspect of its lifetime under forest stewardship standards: long growth cycles, small clear cuts, wider water ways, and limited herbicide use

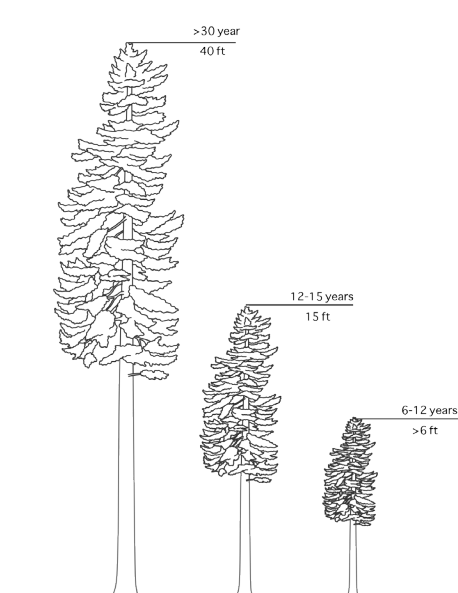
Manufacturing consists of debarking, cutting and air drying the wood to prepare dimensional lumber, which they be laminated through adhesives, dowels, or interlocking techniques.

After after, the panel is transported on site to be assembled and constructed, typically as columns/beams or shear walls for mass timber products. Wood is hygroscopic and should be protected as such. However, paints or chemicals that do so might undermine its reusability.

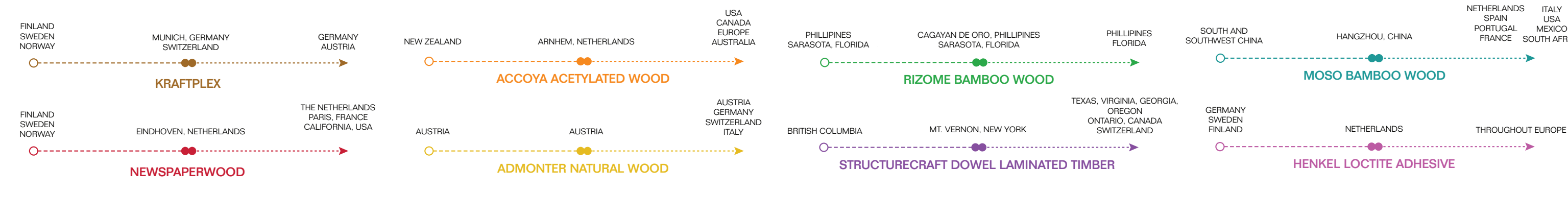
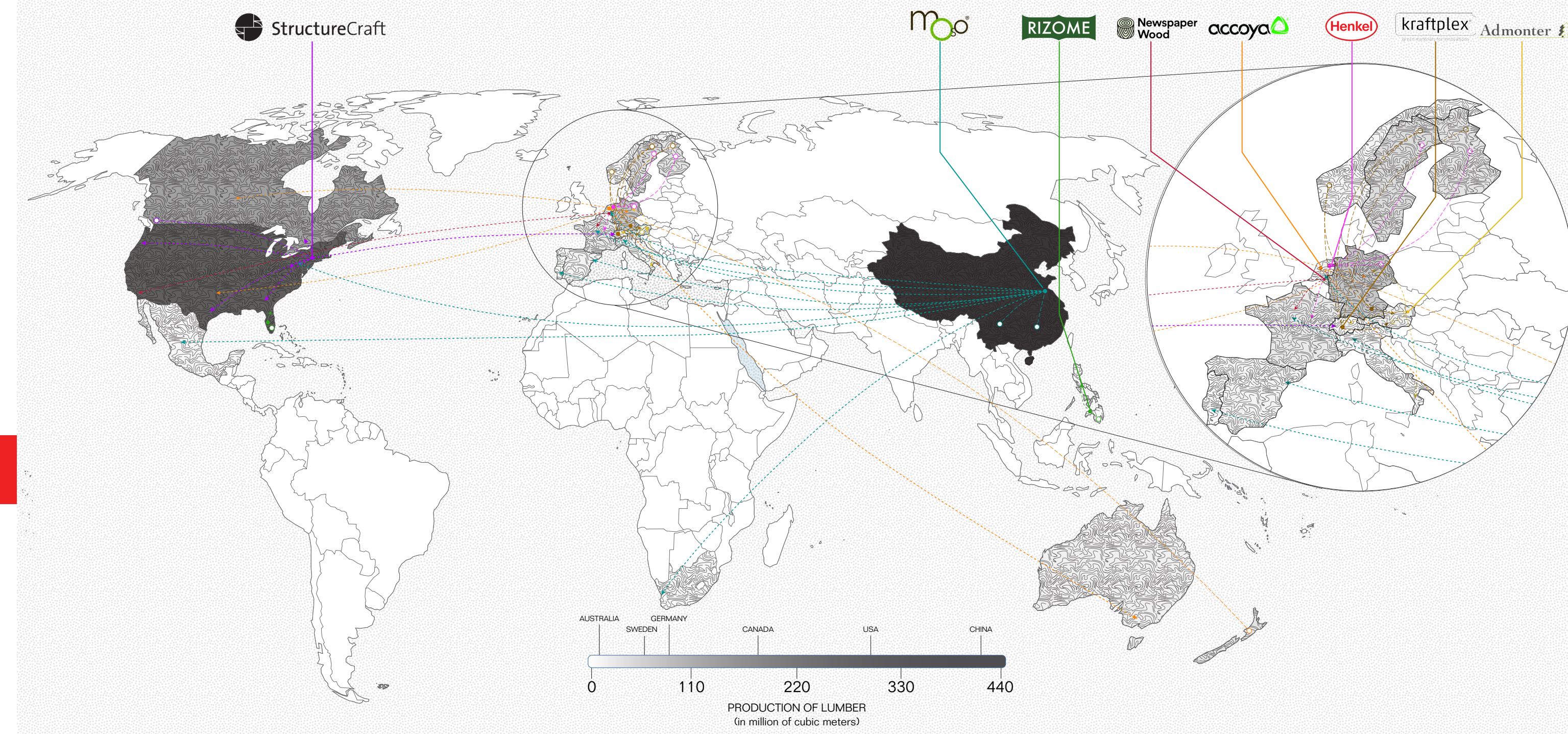
RECYCLE/ END OF LIFE CYCLE



GROWTH TIMELINE OF DOUGLAS



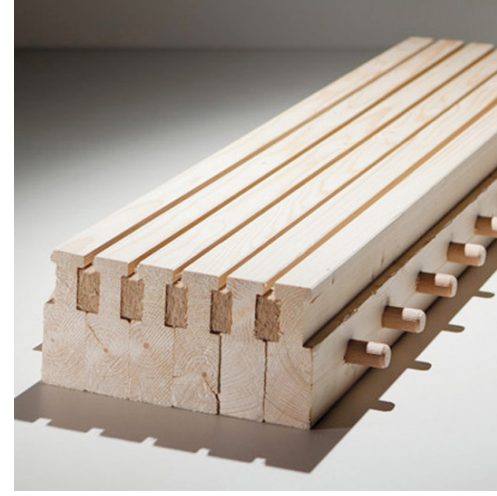
Map of Extraction, Production, and Consumption



Material Taxonomy

Paper-Based Products	Fabricated Wood Products	Natural Wood Products	Bamboo Products	Mass Timber Products	Wheat-Based Products	Natural Adhesives
Newspaper Wood	Made of Air Biochar	Accoya Wood	MOSO Bamboo	Interlocking Timber	OSSB Made of Wheat	Bio-Based Plant Adhesive
Vulcanized Paper	Eggshell/Sawdust	Admonter Wood	NativeBamboo	Strap Laminated Timber	MDF Made of Straw	Soy Adhesive
Kraftplex	Acoustical Wood Ceiling	Discarded Tree Fork Joints	Bamboo Hardwood Plywood	Dowel Laminated Timber	Sorghum Straw Board	
Molded Cardboard	Bio-Composite					

Examples of Alternative Products



Dowel Laminated Timber

RESOURCE

Softwood dimensional lumber and hardwood dowels

TYPE

Mechanical joinery

SIZE

Depends on nominal size of dimensional lumber (2x4, 2x4, or 2x8) and amount of laminations, typically 3, 5, or 7 layers.

MANUFACTURER AND DESIGNER

StructureCraft, prefabricates and manufactures mass timber construction. Origin New York, USA. and Manufactured in Canada.

PROJECTS

Tamedia Office Building, Zurich Switzerland and Oregon State University Peavy Hall.

Dowel Laminated Timber (DLT) mechanically joins dimensional lumber through hardwood dowels. These dowels are dried to moisture levels below that of the softwood, allowing them to swell after being placed in position, thereby enhancing the structural integrity of the assembly. DLT is load bearing and performs structurally as a shear wall if cross laminated and beam/column if laminated in one direction.



Interlocking Laminated Timber

RESOURCE

Softwood dimensional lumber

TYPE

Mechanical joinery

SIZE

Depends on nominal size of dimensional lumber (2x4, 2x4, or 2x8) and amount of laminations, typically 3, 5, or 7 layers.

MANUFACTURER AND DESIGNER

Various; includes manufactureres in USA, China, and Japan

PROJECTS

Korean and Japanese Wood Framing use a variation of ILT.

Interlocking Laminated Timber (ICLT) employs dovetail and tongue and groove joints to mechanically bond dimensional lumber layers together. This approach mechanically bonds each layer without the need for adhesives.



Strapped Laminated Timber

RESOURCE

Softwood dimensional lumber and metal straps

TYPE

Mechanical

SIZE

Depends on nominal size of dimensional lumber (2x4, 2x4, or 2x8) and amount of laminations, typically 3, 5, or 7 layers.

MANUFACTURER AND DESIGNER

Circular Construction Lab, Ithaca New York.

PROJECTS:

People's Pavillion Hester van Dijk, Peter van Assche, Reinder Bakker People

Strapped timber refers to wooden planks or beams that have been reinforced or bound together using metal straps, bands. The strapping prevent the timber from warping, twisting, or otherwise failing under pressure. A limitation of the technique is that its only been tested in temporary projects, such as the People's Pavillion, so its durability is untested. The metal straps also don't fully secure the laminations, so there risks the lumber shears and shifts parallel to the lamination



Bio based Plant Adhesive

RESOURCE

formaldehyde-free out of plant based products such as lignen or wheat

TYPE

Natural Adhesive

SIZE

Adhesive are based on manufacturer. Jowat sells biobased adhesives in 10-25kg (plastic) fluid.

MANUFACTURER AND DESIGNER

Henkel Adhesive Technologies, Jowat Adhesives.

PROJECTS:

Oakridge Centre, Vancouver, Canada, T3 Minneapolis, USA

Molded cardboard is made by creating a mixture of shredded cardboard, glue, and water, and blending the mixture. The excess water is then removed and the mixture is placed in a three-part mold. This mold is placed in a vise and further compressed to remove the water and leave a hardened, paper-based material similar to MDF or OSB.



Soy Skins Adhesive

RESOURCE:

soy-based adhesive sheet, 100% bio-based content

TYPE

Natural Adhesive

SIZE

various sizes in a maximum width of 8 ft

MANUFACTURERE & DESIGNER

E2E Materials

BENEFITS

natural replacement for formaldehyde and phenol-based resin in plywood also has good structural integrity and flexibility

SUSTAINABILITY

Biodegradable, Biopolymers, Compostable, Low Carbon Footprint, Low Toxicity, Renewable Content



Flour-Based-Glue

RESOURCE

Flour and sugar

TYPE

Adhesive

SIZE

Varies

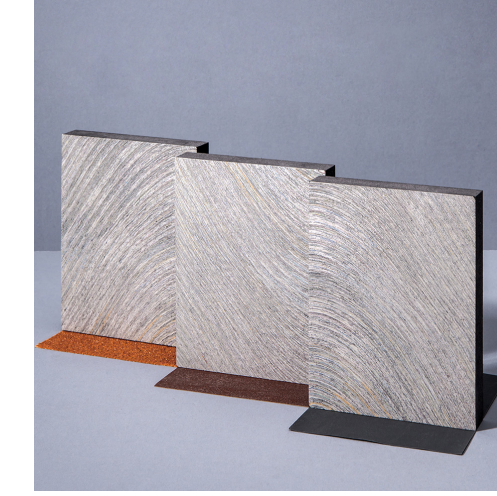
PROJECTS

N/A

MANUFACTURER AND DESIGNER

Do it yourself (DIY)

Flour-based glue is a natural, non-toxic glue that can easily be made at home. Flour is mixed with water and sugar (with vinegar or lemon juice sometimes added as a preservative). The mixture is then stirred and heated until it thickens. It is a suitable alternative to Elmer's Glue, though it is not as strong as industrial-grade binders..



NewspaperWood

RESOURCE

Recycled newspaper

TYPE

Densified

SIZE

Max 140 mm x 380 mm x custom thickness

MANUFACTURER AND DESIGNER

Mieke Meijer with Vij5, Eindhoven, the Netherlands

PROJECTS

Peugeot Exalt Concept Car Interior

NewspaperWood is made from waste newspaper sheets that are wrapped around a rod or dowel and glued together to create a "log" made of newspaper. The newspaper log is then processed similarly to a log from a tree and made into different kinds of wood products.



Vulcanized Paper

RESOURCE

Cellulose and zinc chloride

TYPE

Transformed

SIZE

Varies depending on manufacturer

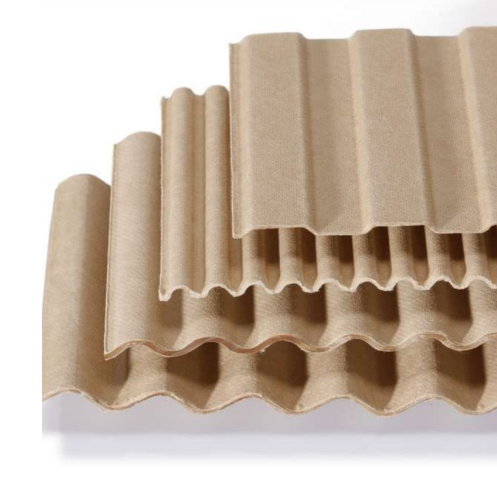
MANUFACTURER AND DESIGNER

Various; includes manufactureres in USA, China, and Japan

PROJECTS

Ryuji Nakamura's Hechima Chair Series

Vulcanized paper is a hardened paper product made from cellulose that is processed with zinc chloride to harden it further. It has excellent electric insulative properties, and is used primarily for this. It can also be used to make structural, load-bearing forms.



Kraftplex

RESOURCE

Cellulose

TYPE

Densified

SIZE

Maximum size of 200 cm x 150 cm

MANUFACTURER AND DESIGNER

Kraftplex, a subsidiary of FranzBetz Vision, founded by Franz Betz, Hanover, Germany

PROJECTS

Wellboard: corrugated Kraftplex

Kraftplex is a sheet material meant as a surrogate to corrugated aluminum and plastic. It is made from heated and compressed cellulose, which gives it a greater strength than other paper-based boards. It can be laser-cut and processed similarly to other wood-based products.

Examples of Alternative Products



Molded Cardboard

RESOURCE

Recycled paper and cardboard

TYPE

Densified

SIZE

Depends on size of mold

MANUFACTURER AND DESIGNER

Do it yourself (DIY)

Molded cardboard is made by creating a mixture of shredded cardboard, glue, and water, and blending the mixture. The excess water is then removed and the mixture is placed in a three-part mold. This mold is placed in a vise and further compressed to remove the water and leave a hardened, paper-based material similar to MDF or OSB.

Examples of Alternative Products



Organic Acoustical Wood

RESOURCE:
Recycled fiber acoustical panels, wood fibers

TYPE
Acoustical Panel: Non-structural

SIZE
Panel options: 2 x 2, 2 x 4, 2 x 6 ft

MANUFACTURER & DESIGNER
AcoustiGreen

SUSTAINABILITY
Biodegradable, Certified, Compostable, Easily Recyclable, Low Toxicity, Renewable Content



EcoBrick Eggshell

RESOURCE:
Eggshell waste, calcium carbonate & combining it with sustainable aggregates

TYPE
Brick for walls: Structural

SIZE
20 x 20 cm

MANUFACTURER & DESIGNER
Manufactura x by Dinorah Martínez Schulte

SUSTAINABILITY
Recycled Content (Pre- or Post-Consumer), Renewable Content, Biodegradable, Biopolymers, Compostable



EcoBrick Eggshell & Sawdust

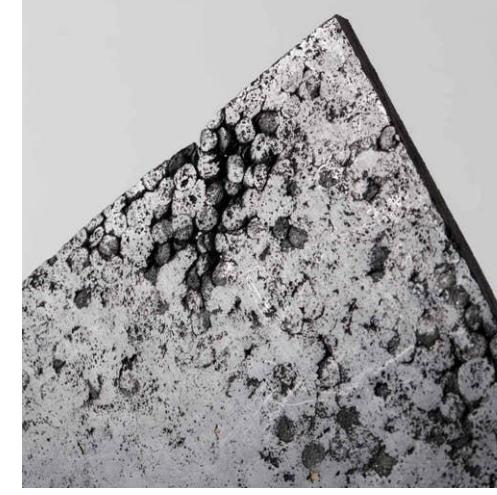
RESOURCE:
Eggshell & Sawdust waste

TYPE
Brick for walls: Structural

SIZE
20 x 20 cm

MANUFACTURER & DESIGNER
Manufactura x by Dinorah Martínez Schulte

SUSTAINABILITY
Recycled Content (Pre- or Post-Consumer), Renewable Content, Biodegradable, Biopolymers, Compostable



Made of Air

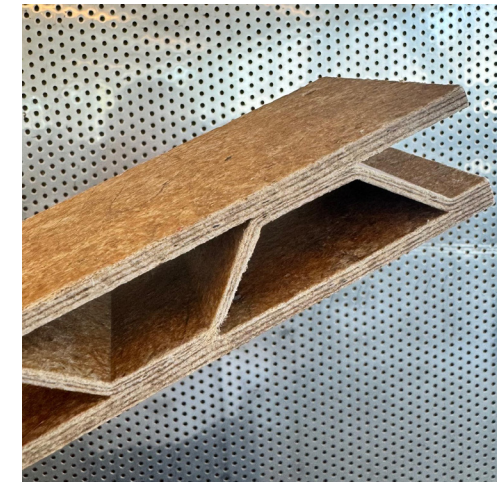
RESOURCE:
90% atmospheric CO₂ from waste biomass absorbed CO₂ then baked by pyrolysis (an oxygen-free oven) and is combined with a series of plant-based thermoplastic binders

TYPE
Function can vary

SIZE
varies

MANUFACTURER & DESIGNER
Made of Air

SUSTAINABILITY
Abundant Materials, Low Carbon Footprint, Renewable Content



Structural Bio-Composite

RESOURCE:
bio-composite, wood composite with soy-based resin system and natural annually renewable fibers including jute, flax and kenaf

TYPE
Hardsurfaces: Structural

SIZE
varies
MANUFACTURER & DESIGNER
E2E Materials

SUSTAINABILITY
Sustainability Biodegradable, Biopolymers, Low Toxicity, Renewable Content, Waste Material Content



Renewable Bamboo Plywood

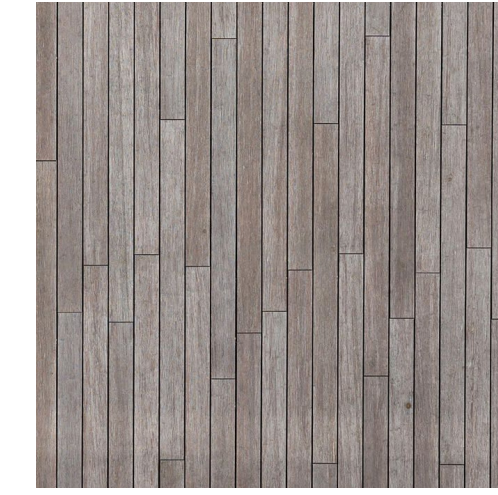
RESOURCE:
asper bamboo, compliant phenolic resin and borate from pressure treatment.

TYPE
Flooring: Non-structural

SIZE
Panel 4 ft x 8 ft

MANUFACTURER
Rizome

SUSTAINABILITY
Low Carbon Footprint, Renewable Content



MOSO Bamboo

RESOURCE
Bamboo

TYPE
Bamboo Outdoor Wood

SIZE
Varies depending on the manufacturer, but typically available in standard dimensions for flooring, decking, and panels, with options ranging from typical plank lengths and widths to specific thicknesses suitable for different applications.

MANUFACTURER AND DESIGNER
MOSO Bamboo

PROJECTS
Outdoor bamboo products for residential and commercial use. Natural bamboo Decking, Rainscreen Siding, Soffit, T&G, and stock lumber.

Sustainability
Extremely durable, having a longer life cycle than most hard woods, and also sustainably sourced.



NativeBamboo

RESOURCE
Bamboo and Metal Mesh

TYPE
Woven

SIZE
Depends on the product line and customization options, but they typically come in standard panel sizes.

MANUFACTURER AND DESIGNER
GKD

PROJECTS
N/A

Sustainability
Bamboo is extremely durable compared to hardwoods and is much easier to sustainably harvest.



Accoya Wood

RESOURCE
Natural Wood

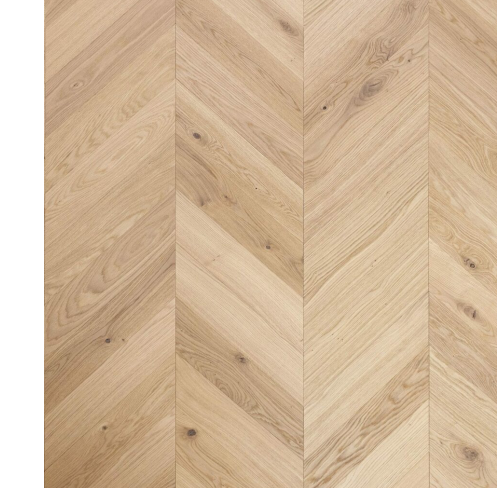
TYPE
Acetylation

SIZE
Available in various sizes, including standard dimensions commonly used in construction and woodworking projects.

MANUFACTURER AND DESIGNER
Accoya

PROJECTS
It's utilized in exterior cladding, windows, decking, structural applications, and more, owing to its remarkable durability, stability, and resistance to decay.

Sustainability
Lower carbon emissions. Sustainably sourced wood.



Admonter Wood

RESOURCE
Natural Wood

TYPE
Heat-treated

SIZE
They are available in various sizes, including standard dimensions commonly used in construction and woodworking projects.

MANUFACTURER AND DESIGNER
Admonter

PROJECTS
It is used for interior flooring, wall cladding, furniture, and hospitality interiors, offering timeless elegance and durability across residential, commercial, and public spaces.

Sustainability
Wood derived from sustainably managed forests, and are focused on waste recovery and prevention and energy management.

Examples of Alternative Products



Discarded Tree Fork Joints

RESOURCE:

tree joints and 3D scanning, generative modelling and robotic fabrication to cut it

|

TYPE

Truss: Structural

|

SIZE

Depends on the tree part

|

MANUFACTURER/ RESEARCH

Design + Make

|

SUSTAINABILITY

Renewable Content, Waste Material Content



MDF Board Made of Agricultural Waste

RESOURCE

Rice Straw (Agricultural Waste)

|

TYPE

MDF Board

|

SIZE

Varies depending on the manufacturer, but typically available in standard panel sizes.

|

MANUFACTURER AND DESIGNER

Calplant

|

PROJECTS

N/A

|

Sustainability

It reduces agricultural waste. It is made using all natural products. It reduces water usage in California, and has lower CO2 emissions.



Kieri Wood Alternative

RESOURCE:

reclaimed raw sorghum stalks compressed, washed, woven into sheets, then stacked and heat-pressed with a formaldehyde-free adhesive

|

TYPE

Composite Board: Structural

|

SIZE

Desirable sizes- 1x3 ft and 3x6 ft

|

MANUFACTURER

Kieri

|

SUSTAINABILITY

Low Toxicity, Recycled Content (Pre- or Post-Consumer), Renewable Content, Waste Material Content



OSSB Board Made of Wheat

RESOURCE

Wheat Straw

|

TYPE

OSSB Board

|

SIZE

Varies depending on the manufacturer, but typically available in standard panel sizes.

|

MANUFACTURER AND DESIGNER

CaraGreen

|

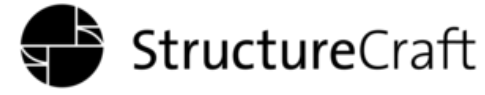
PROJECTS



N/A

|

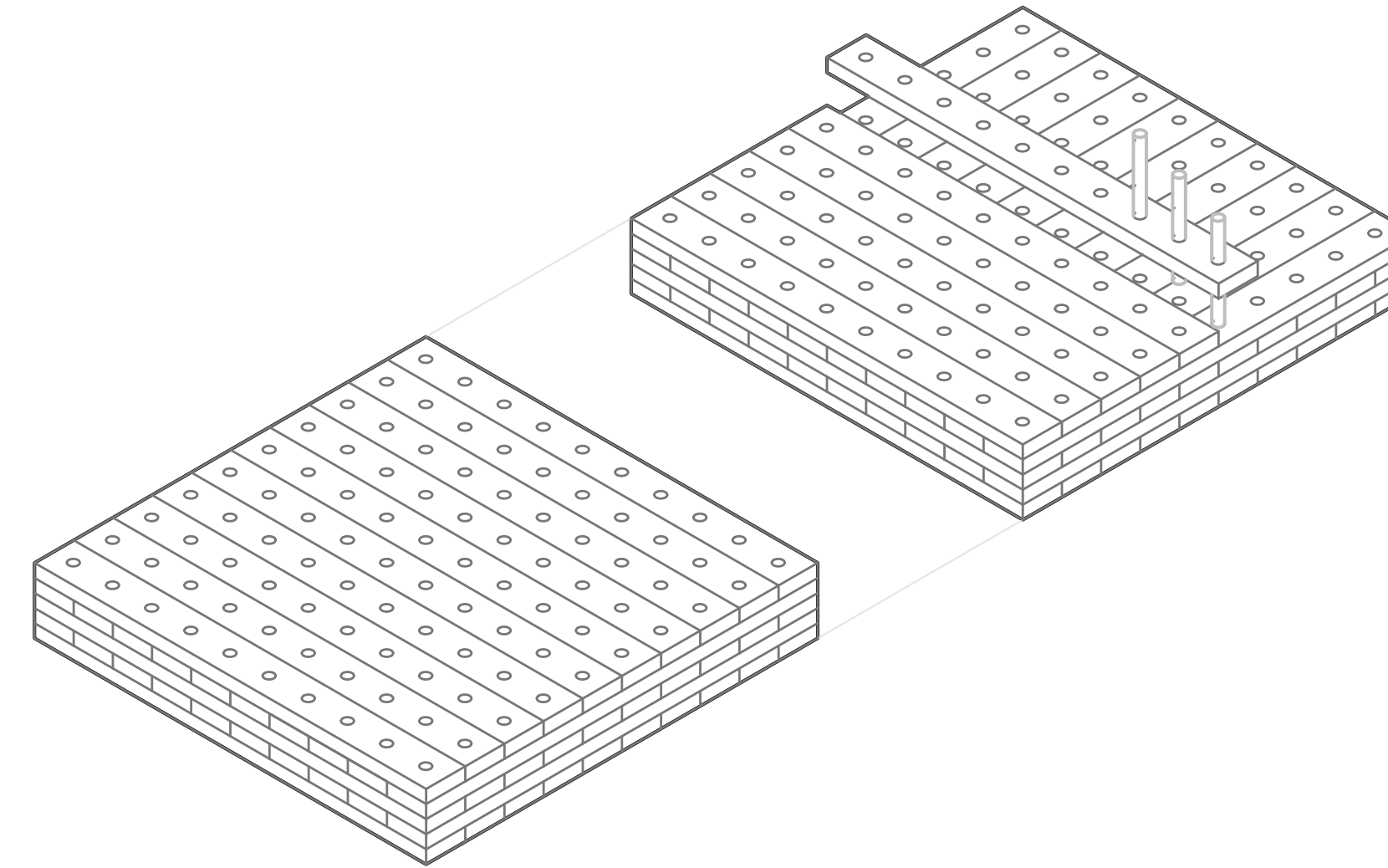
Sustainability

Natural materials are used, making it an eco-friendlier alternative.

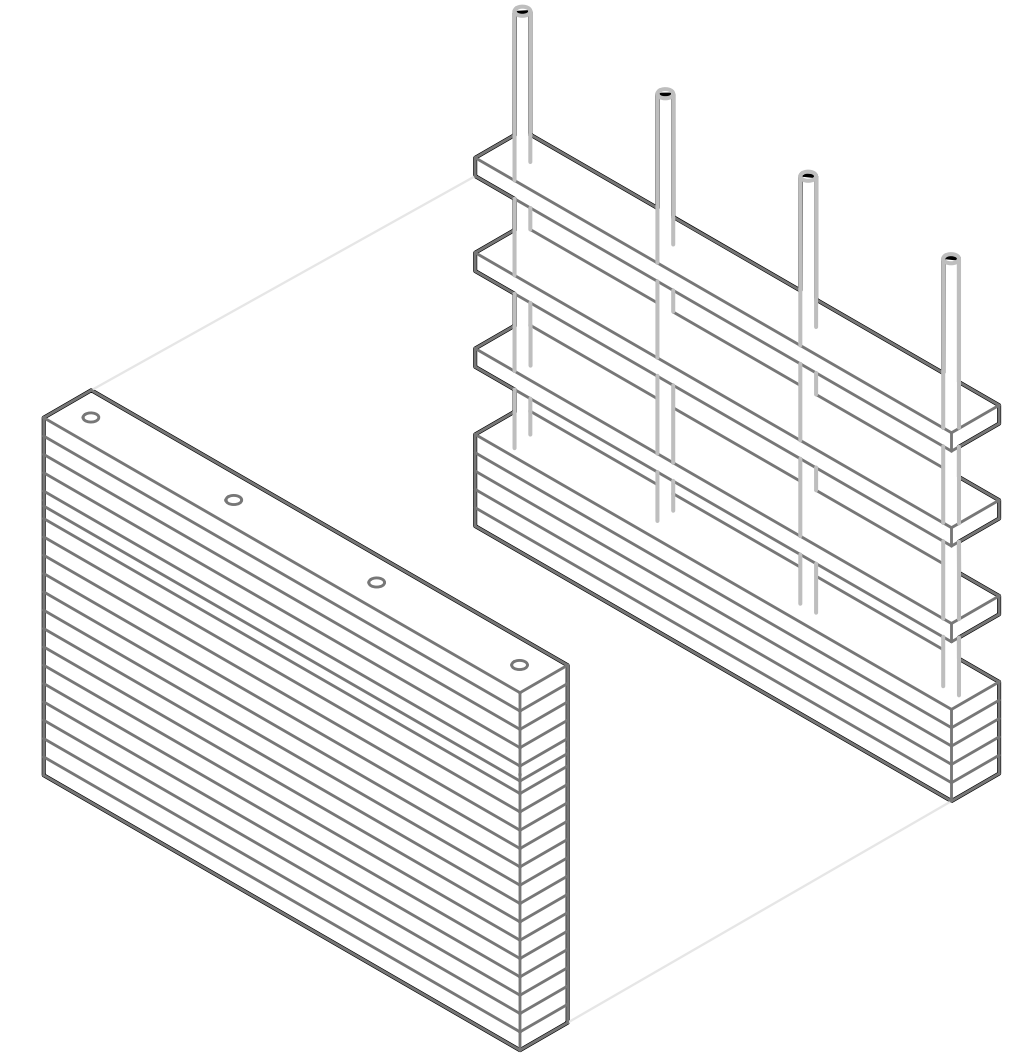


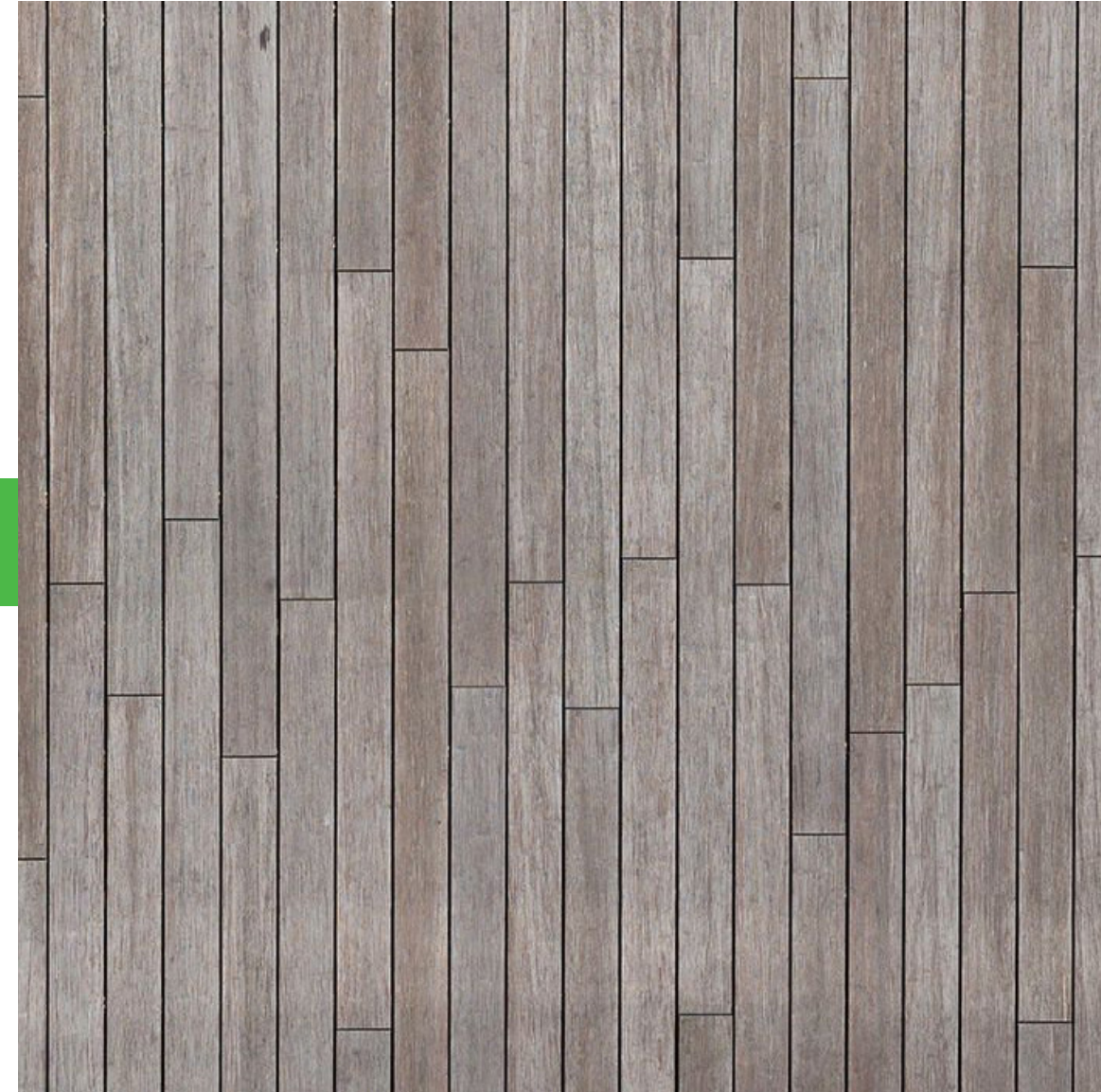
Product Type and Application	Dowel Laminated Timber (DLT) or Cross Dowel Laminated Timber (CDLT)
Chemical Composition	Binded with dowels and minimal adhesives. Therefore the chemical composition is its dimensional softwood lumber: 30% Lignin, 30% Hemicellulose, 40% Cellulose
Possible Human Health Implications	May include Formaldehyde adhesive as a secondary binder to the mechanical dowel joint. Health risks include carcinogens, asthagens, and high VOCs.
Possible Environmental Implications	Embodied carbon emissions in transporting prefabricated parts from the manufacturing facility to the construction site. If not recycled properly at the end of its use, DLT could contribute to carbon emissions through land fill waste.
Affordability	Affordability, depends on size/thickness of the laminated panel, wood species, and transportation to the construction site. Prices are competitively marketed with CLT/GLT. Therefore, there's a potential price range between \$30 to \$80 per square foot.
End of Life	<ol style="list-style-type: none"> 1, Reuse: If in good conditions, DLT can be reused in other projects. Dowel lamination enable reuse and parts to be disassembled and reassembled 2, Recycled: DLT panels can be downcycled into MDF or particle boards. 3, Landfill: As a last resort option, DLT can be disposed to landfill.
Pros	<ol style="list-style-type: none"> 1. DLT reduces adhesive products in mass timber products. 2. Sequesters carbon during its life time during harvesty and the tree's growth. 3. Mechanical dowel joinery enables DLT to be disassembled and reassembled for Reuse.
Cons	<ol style="list-style-type: none"> 1. DLT may contain adhesives as a secondary binder with health risks. 2. DLT has lower shear and moment forces than CLT/GLT adhesive alternatives.
Certifications	 



Cross Dowel Laminated Timber (CDLT)



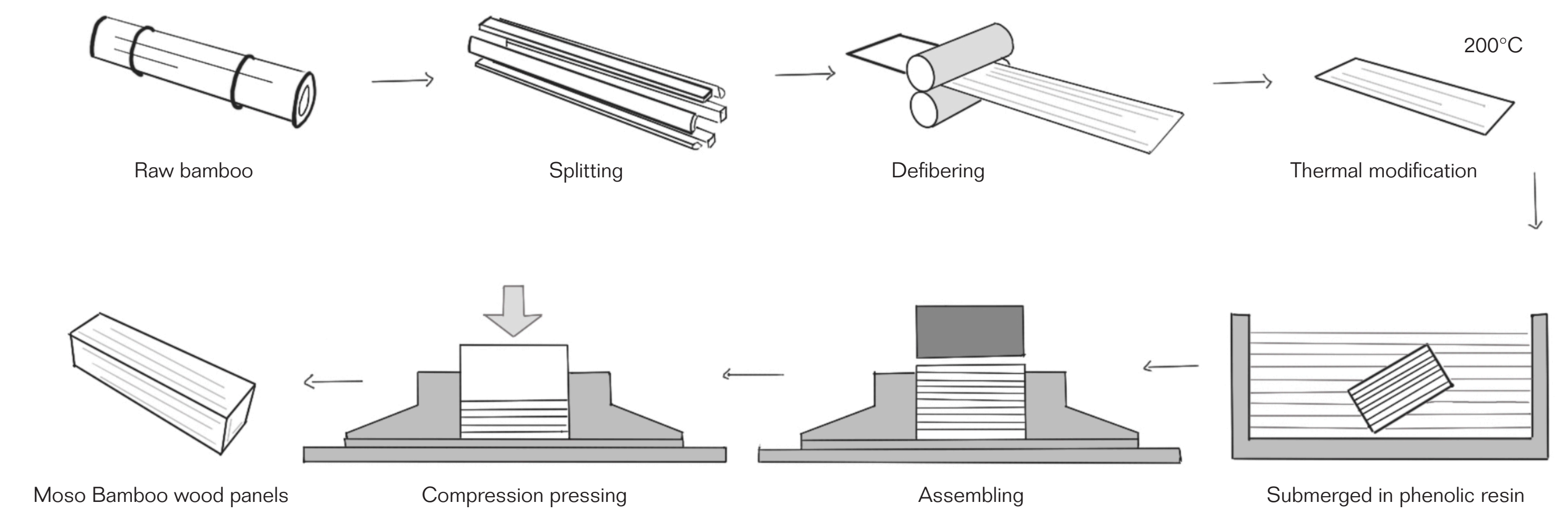
Dowel Laminated Timber (DLT)





Product Type and Application	MOSO Bamboo (Outdoor bamboo products)
Chemical Composition	Contains Vocs
Possible Human Health Implications	No formaldehyde emission is detectable, with Moso Bamboo having the lowest possible rating.
Possible Environmental Implications	Extremely durable, having a longer life cycle than most hard woods, and also sustainably sourced.
Affordability	Considered premium material due to sustainability and durability. As a result, it can be more expensive than traditional products. Sample was given by MOSO for free and MOSO does not disclose prices without a quote.
End of Life	Its upcycled/burned in a biomass energy plant, creating green(er) electricity.
Pros	The bamboo plant does not die after harvesting, eliminating deforestation. By harvesting the mature plants, the yield and quality of the plantation increase.
Con	It is more vulnerable to pests and decay, has a large carbon footprint when it comes to transportation, and may not be as durable as other competing products.
Certifications	 

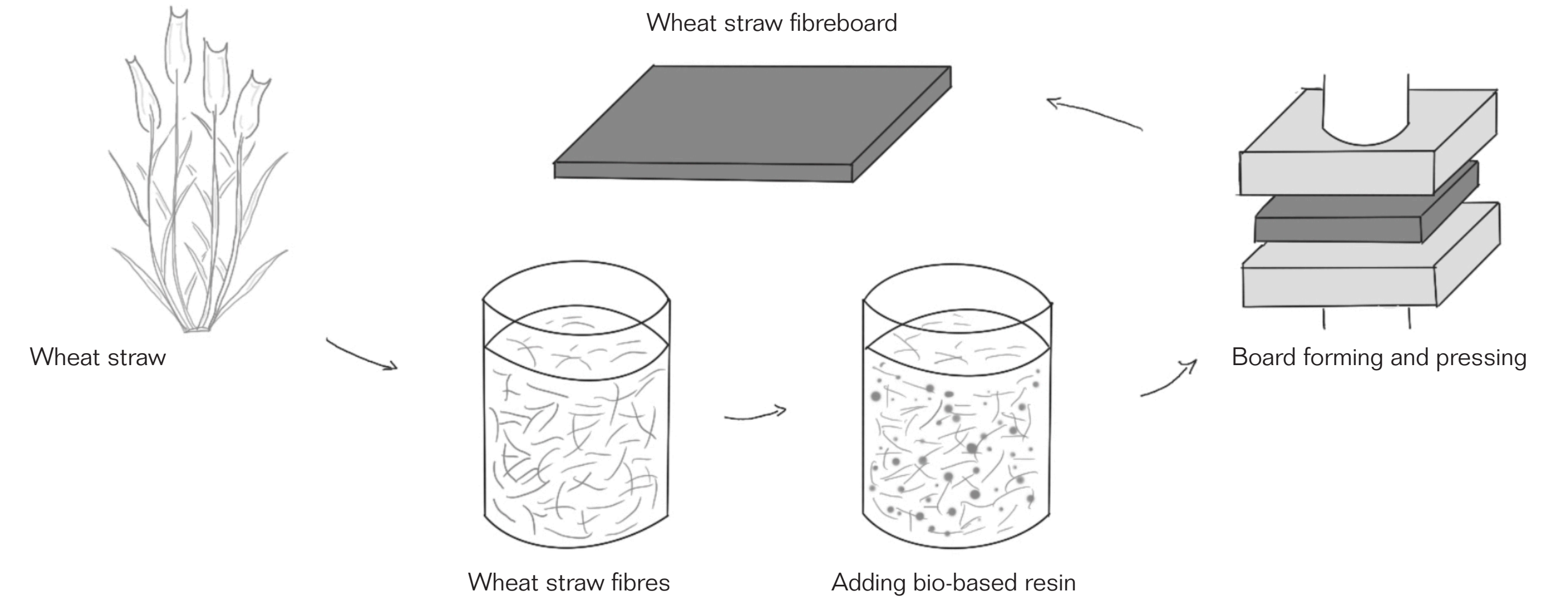
Bamboo Wood Production



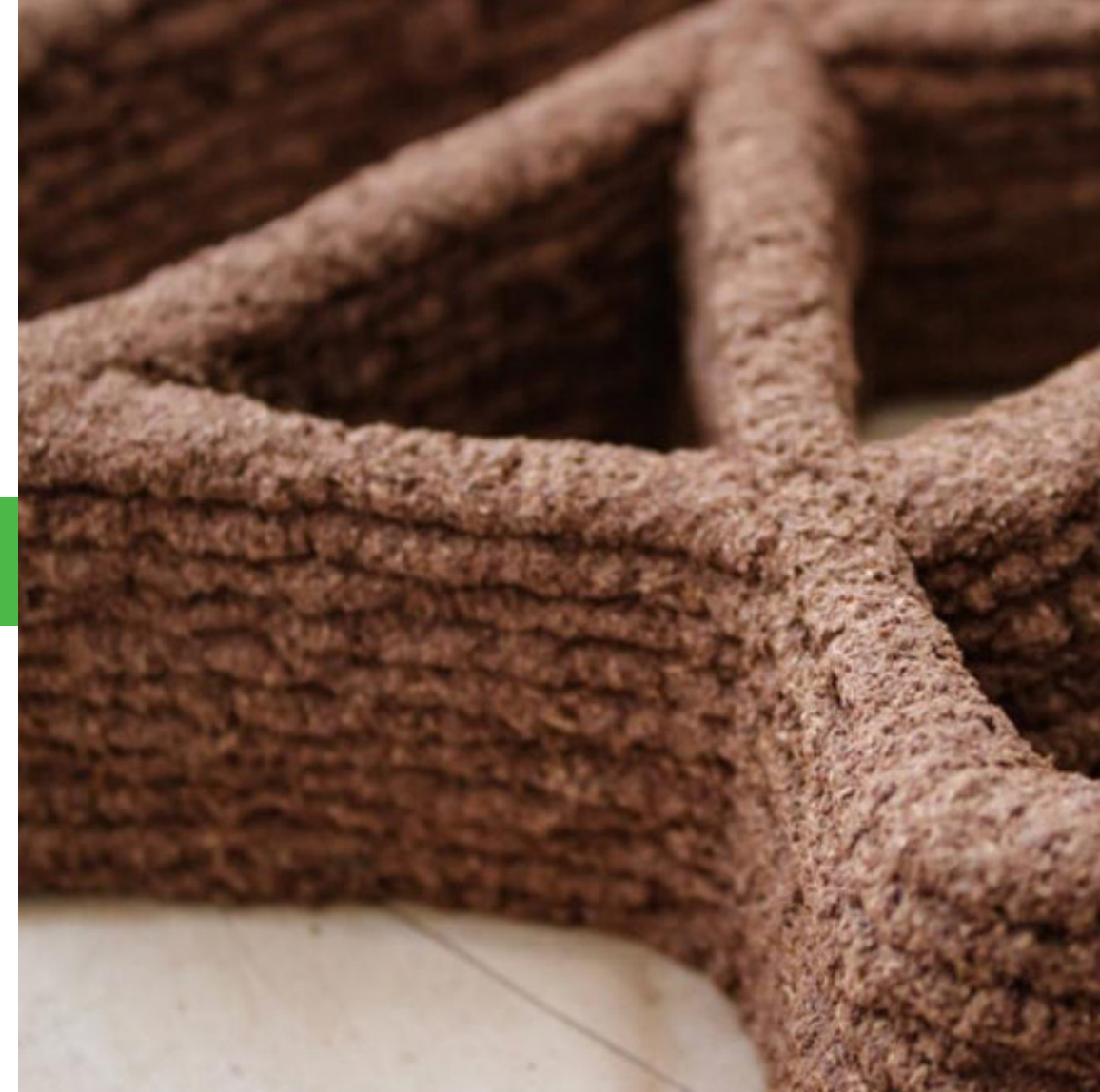


Product Type and Application	OSSB made of Wheat Straw
Chemical Composition	No Fromeldahyde. It uses a non-toxic MDI binder.
Possible Human Health Implications	It has no toxicants for human exposure.
Possible Environmental Implications	Natural materials are used, making it an eco-friendlier alternative.
Affordability	It can be relatively affordable depending on various factors including region, availability, and specific market conditions.
End of Life	It can be reused, recycled, biodegraded, and/or used to generate green energy.
Pros	Wheat straw improves moisture resistance, is non-emitting, non-toxic, and is made from rapidly renewable resource- post industrial recycled content.
Cons	OSSB can be susceptible to moisture absorption and swelling if not properly sealed, there is limited availability, inherently have lower fire resistance, and has strength variability.
Certifications	

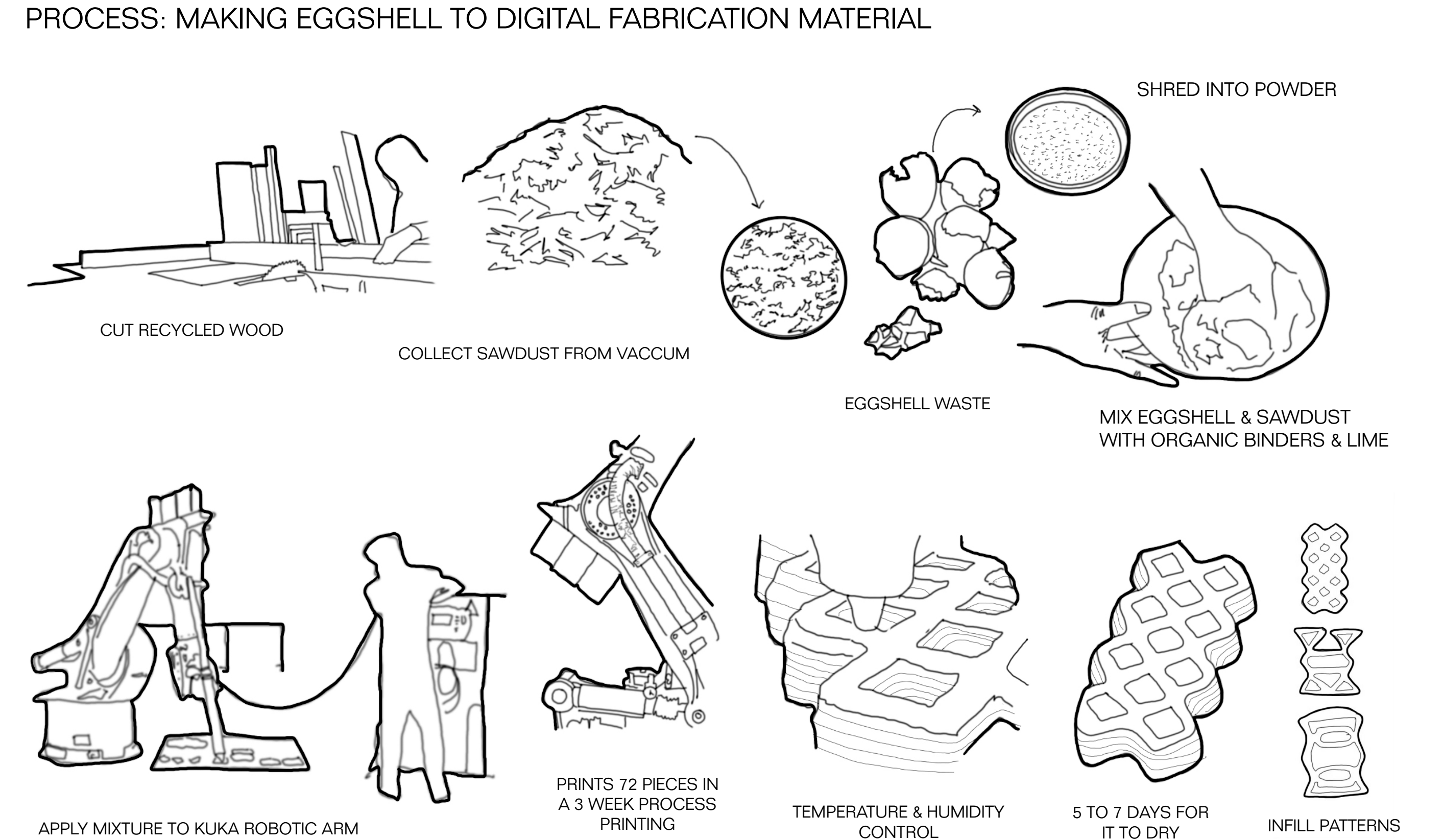
CaraGreen Wood Production



CAL VIVA MANUFACTURA

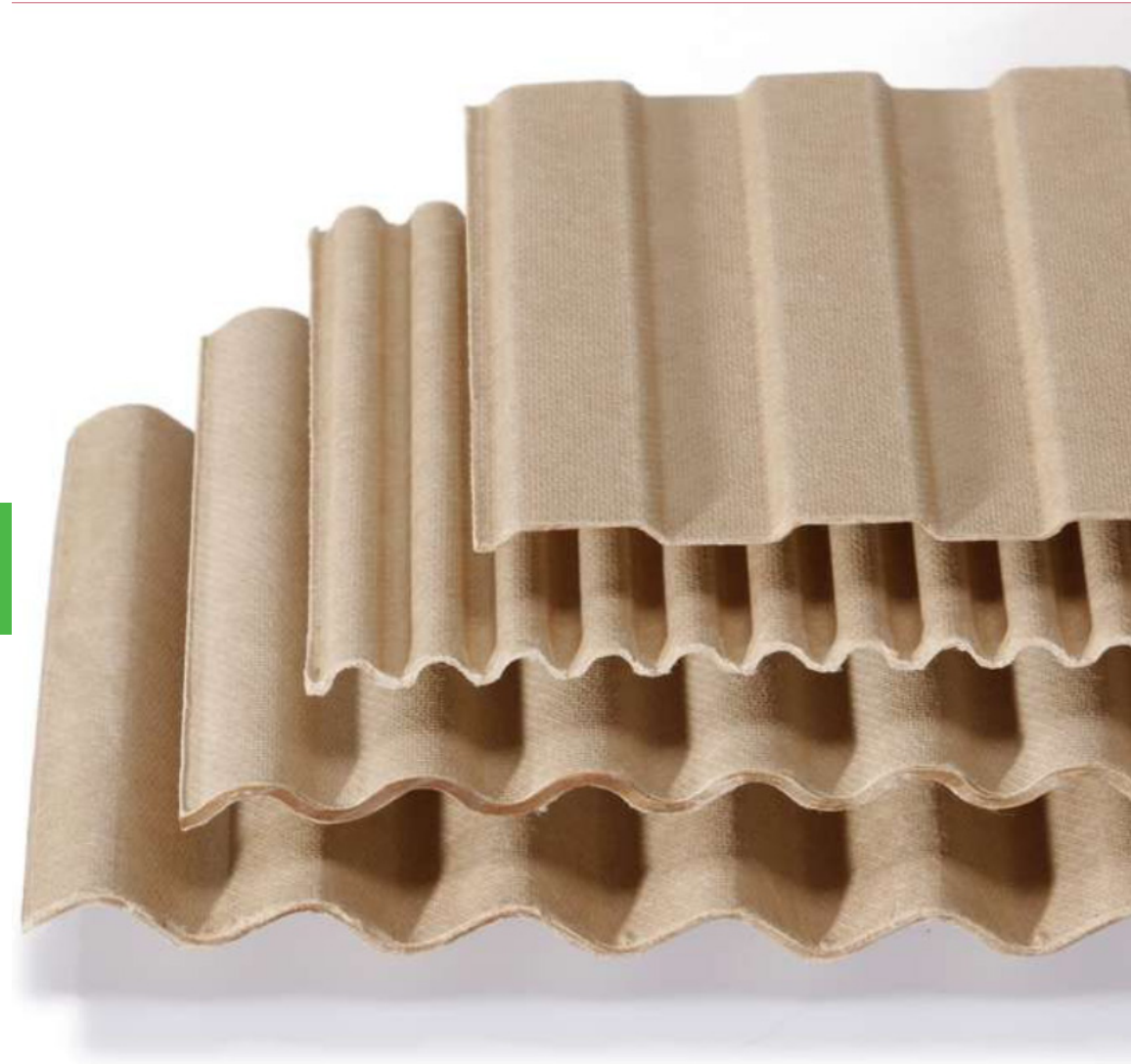


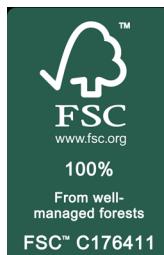

Product Type and Application	EcoBrick with Eggshell & Sawdust
Chemical Composition	Bioceramic from sawdust waste from the Tzalam tree and eggshell waste with organic binders and lime & gypsum, the mixture is able to solidify without the need of firing, it uses digital fabrication 3D printing with a robotic arm.
Possible Human Health Implications	Bio-composite has low VOCs improve air quality, material can develop fungal growth due to high humidity & biodegrade to dust later used for landfill
Possible Environmental Implications	recycling, sanitization, manufacturing, and site construction methods. biomaterials derived from fungi or agro-waste provide environmentally friendly construction. 70% goes to the sawmill industry, which generates around 2.8 million m ³ of waste, mainly sawdust, chips, and bark alternatives
Affordability	sample cost per brick \$100 including shipping
End of Life	eggshells biodegrade in one year for them to break into soil
Pros	<ul style="list-style-type: none"> - seeks to reduce and reuse the sawdust waste generated in the factory - reduce the abundant level of food and organic waste in Mexico while generating new opportunities through technology and innovation - manual fabrication is deeply ingrained, specialized, and cost-efficient in some sectors, making digital substitution less pressing - product is developed rapidly printing 72 bricks in 3 weeks and 5-7 days drying - The impact of digital fabrication and biomaterials is being answered in the different proposals emerging at a global scale - brick has a lightness weight of 207 gr total each brick of 20 x 20 cm
Cons	<ul style="list-style-type: none"> - eggshell as an agricultural waste may cause environmental pollution when it is not properly disposed of in the environment - international transportation - research conducted some fails as their mixture had developed fungal growth through humidity: thus they are still conducting new mixtures
Certifications	





green materials for innovations

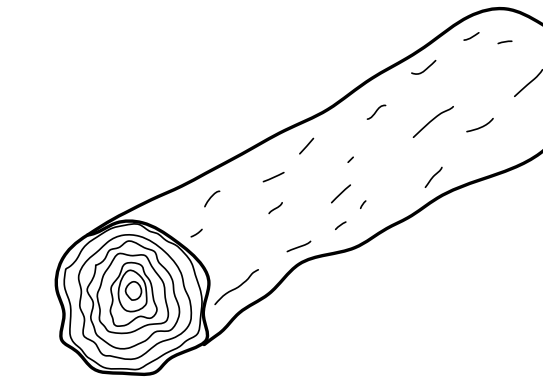


Product Type and Application	Kraftplex, Cellulose-based replacement for metal or plastic sheeting
Chemical Composition	100% cellulose, which is heat treated and pressed into sheets. The fibers interlock, giving the materials strenght via physical as opposed to chemical means.
Possible Human Health Implications	No negative human health implications as the product is made without any adhesives, binders, or bleaching agents that may be toxicants
Possible Environmental Implications	No negative environmental implications as the product is made without any adhesives, binders, or bleaching agents that may be toxicants.
Affordability	Expensive compared to materials it is meant to replace (\$56 per square meter for the cheapest large Kraftplex sheet, compared to \$13 per square meter for corrugated metal or under \$12 per square meter for corrugated plastic sheets)
End of Life	Kraftplex cannot be recycled back into Kraftplex as it requires virgin cellulose fibers to be produced; it can only be downcycled or composted.
Pros	<ol style="list-style-type: none"> 1. No harmful additives or toxicants since it is 100% cellulose. This is a healthy building material. 2. Easy to compost or downcycle due to the lack of synthetic materials mixed within the product 3. Beautiful appearance and texture
Cons	<ol style="list-style-type: none"> 1. Kraftplex is very expensive compared to the materials it is meant to be a healthy alternative to (see "Affordability") 2. Not strong enough to be load bearing unlike other wood-based products 3. Rare: Kraftplex is the only notable company that makes these. This can make it harder to source and purchase.
Certifications	 

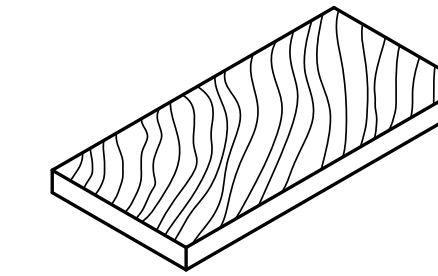
PROCESS: MAKING KRAFTPLEX "WELLBOARD"



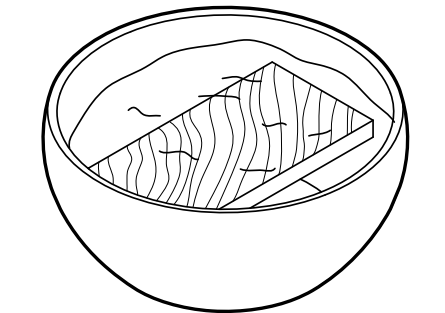
WOOD SOURCED FROM FSC-CERTIFIED FORESTS



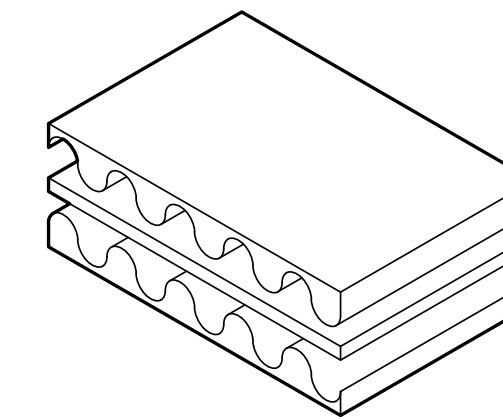
WOOD IS LOGGED



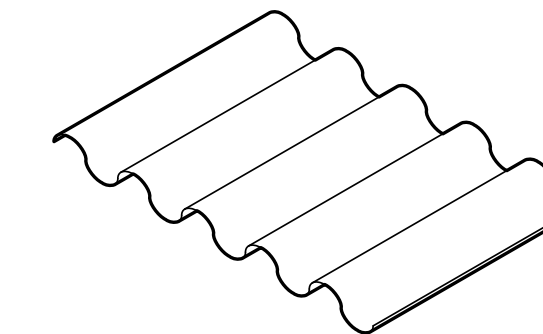
WOOD PROCESSED INTO SHEETS OR PLANKS



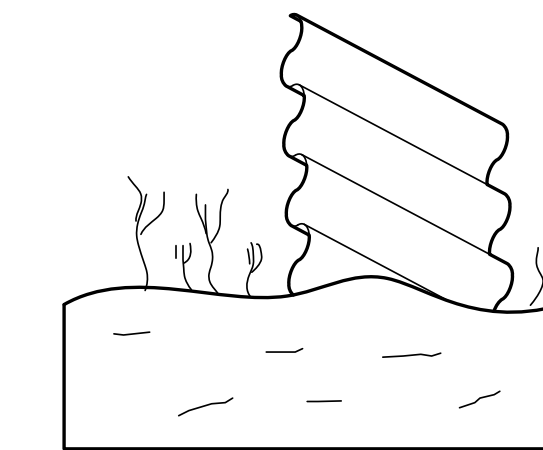
LIGNIN REMOVED FROM WOOD USING CHEMICALS



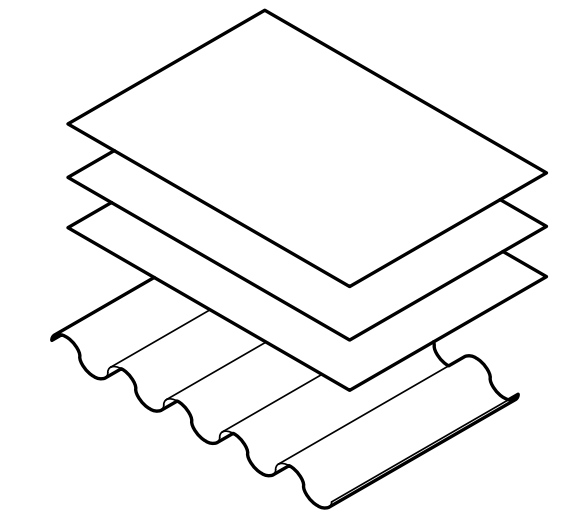
DELIGNIFIED WOOD IS HEAT-PRESSED TO FORM



KRAFTPLEX "WELLBOARD" IS FORMED



KRAFTPLEX CAN BE COMPOSTED...



...OR DOWNCYCLED INTO PAPER

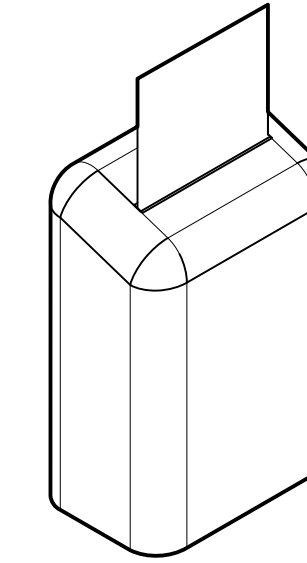
Molded Recycled Cardboard



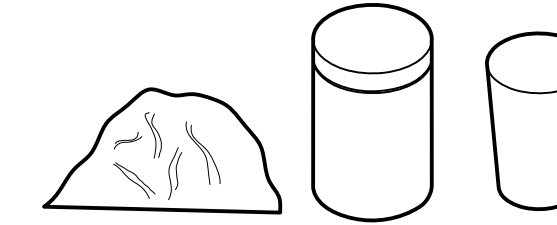
Product Type and Application	Molded Recycled Cardboard/Paper, Furniture and Appliances
Chemical Composition	Mixture varies. They generally contain a cellulose-based product (such as shredded paper or sawdust), as well as a binder (such as a natural or plastic-based glue). The mixture is blended with water. The water is then removed and the mixture is compressed in the mold to remove any additional water.
Possible Human Health Implications	The recycled paper may contain ink and dyes that contain toxic materials. If exposed to significant amounts of such inks, it can cause skin irritation, and if inhaled it can cause lung irritation. PVA glue inhalation may irritate mucus membranes, but would not cause such inhalation considering the small amounts of it in the molded cardboard.
Possible Environmental Implications	PVA cannot be composted. If the molded product is composted, inks from recycled paper may leach into the soil, and the effects of this are uncertain.
Affordability	Molded recycled paper costs almost nothing. It only requires shredded paper, glue, and other household tools like a paper shredder and a blender. It does require a mold, generally 3D printed, as well as clamps or a vise.
End of Life	Versions made with the PVA glue cannot be composted, while those with natural glues can be safely composted provided that the paper itself does not have any toxic inks. All versions can be broken down in water to turn it back into pulp, which can then be molded again.
Pros	<ol style="list-style-type: none"> 1. Very easy to make, provided one has a mold 2. Relatively strong for non-load bearing products 3. Can be easily recycled back to pulp to make more products 4. Can be composted if no plastic or synthetic inks are used 5. Additives such as coffee grounds or egg shells can be added, making the material very customizable.
Cons	<ol style="list-style-type: none"> 1. Requires a 3D printed mold to use. Many people may not have a 3D printer. 2. The molded product is not water resistant, and if placed in water it will eventually weaken. 3. Not able to be used as a load-bearing structure.
Certifications	

PROCESS: MAKING MOLDED PAPER BLOCKS

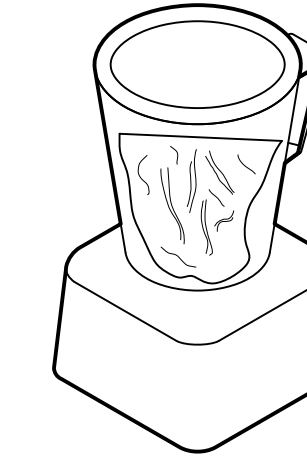
Kraftplex Process Diagram



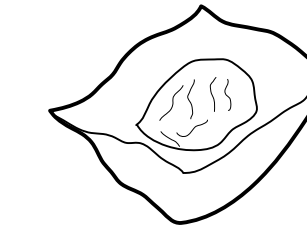
SHRED PAPER



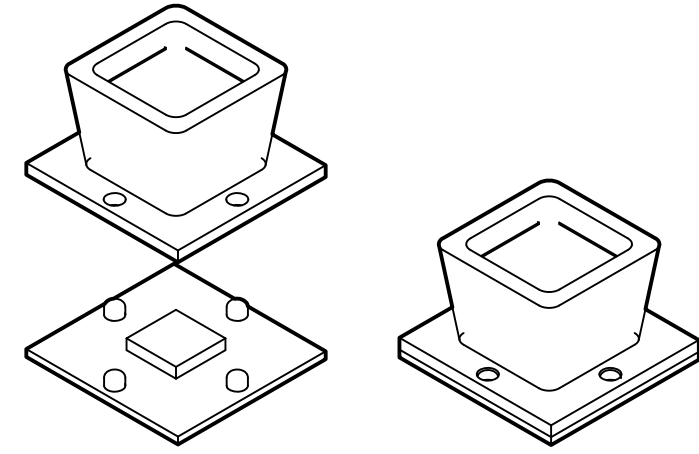
GATHER SHREDS, GLUE, AND WATER



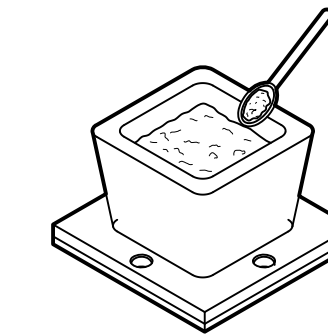
BLEND INGREDIENTS TOGETHER



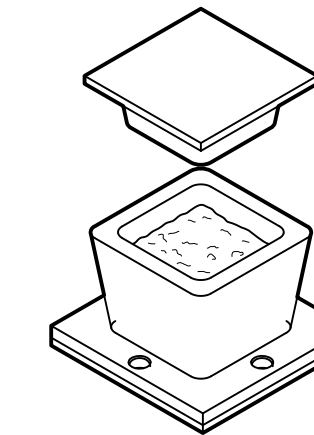
REMOVE SOME WATER FROM MIXTURE



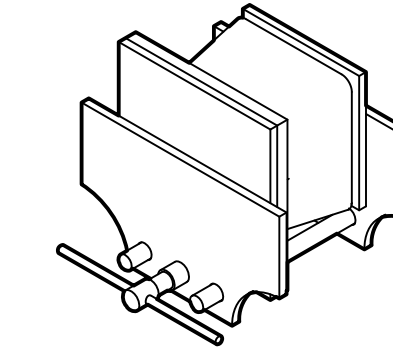
ASSEMBLE WALL AND BASE OF MOLD



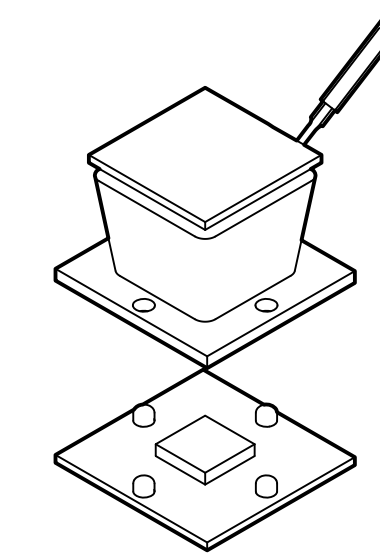
SQUEEZE MIXTURE INSIDE MOLD



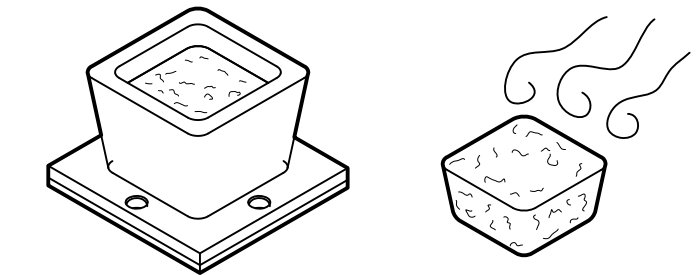
PLACE PRESSER ON TOP OF MOLD



CLAMP MOLD WITH A VISE



REMOVE BASE, PRY OPEN PRESSER

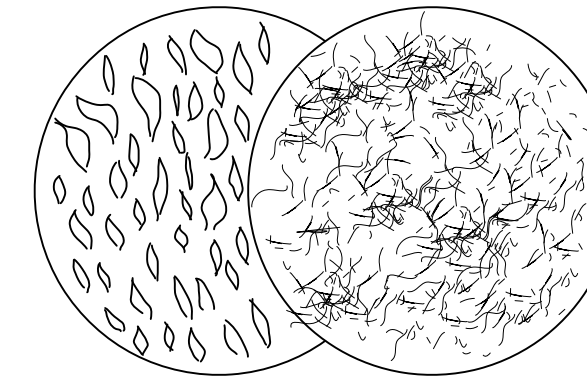


LET BLOCK DRY IN MOLD, REMOVE FROM MOLD, LET BLOCK DRY MORE

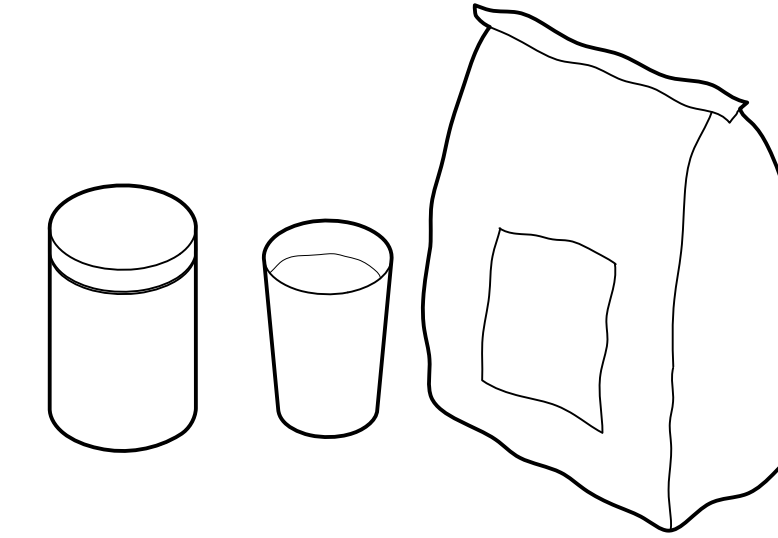


Product Type and Application	Flour-based glue
Chemical Composition	Contains a mixture of white flour, water, sugar, and lemon juice to be used as a preservative. The mixture is heated and stirred until it thickens and becomes a glue.
Possible Human Health Implications	There are no negative human health implications since the entirety of the glue is based from natural materials that lack toxins. However, if left outside of the refrigerator it can grow molds on top, which when breathed in can cause allergic reactions.
Possible Environmental Implications	There are no negative environmental health implications since the entirety of the glue is based from natural materials that lack toxins.
Affordability	The glue is very affordable since it only requires regular household staples like flour, sugar, and water.
End of Life	The glue must be kept in a fridge and it should last about two to three months before going bad. After that, it can be composted.
Pros	<ol style="list-style-type: none"> 1. Very affordable and convenient since it only requires household items to make. 2. Relatively strong for a natural glue--exhibits strength close to or similar to Elmer's Glue. 3. Has no negative health effects other than potential mold growth when not refrigerated properly.
Cons	<ol style="list-style-type: none"> 1. Not as strong as Titebond PVA-based wood glue. 2. Must be kept in a fridge, otherwise it will grow mold within a few days. 3. Even when inside fridge, it only lasts two to three months before going bad. This is a much shorter lifespan than Elmer's glue, which lasts up to five years.
Certifications	

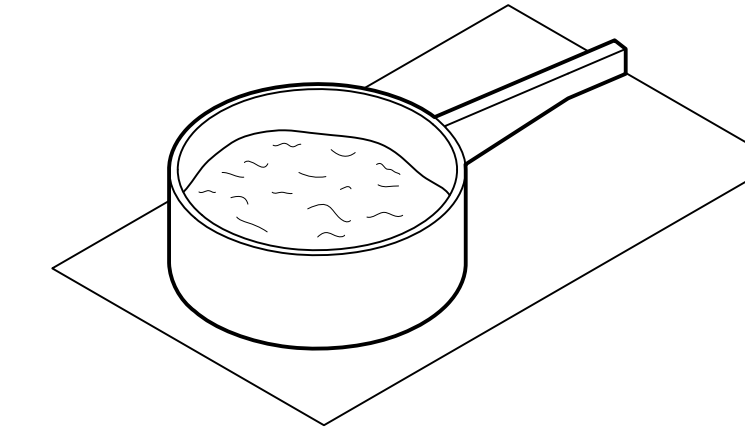
PROCESS: MAKING FLOUR-BASED GLUE



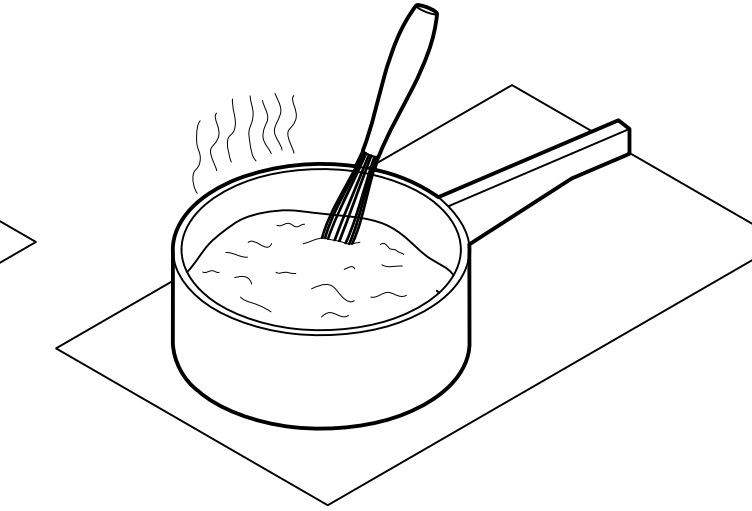
WHEAT PROCESSED TO MAKE FLOUR



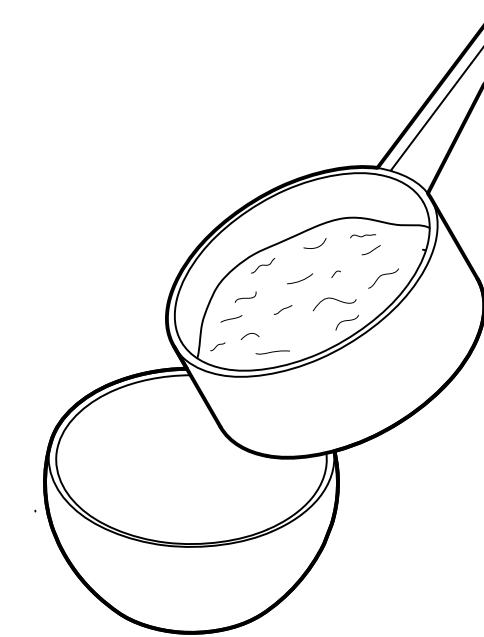
FLOUR, SUGAR, AND WATER GATHERED



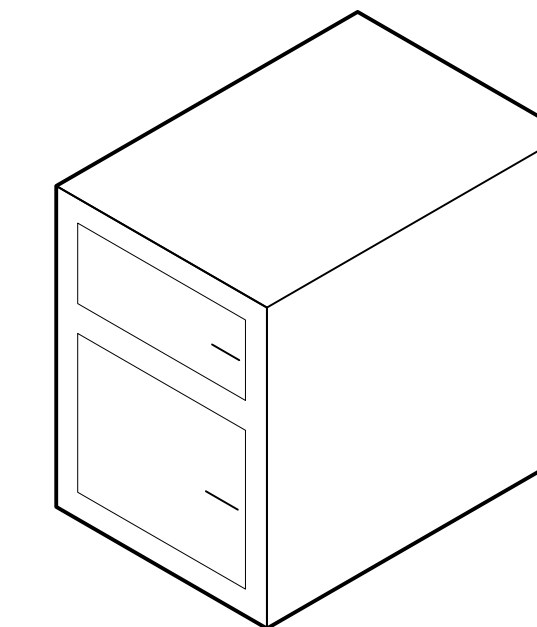
INGREDIENTS PLACED INTO PAN TO BE HEATED



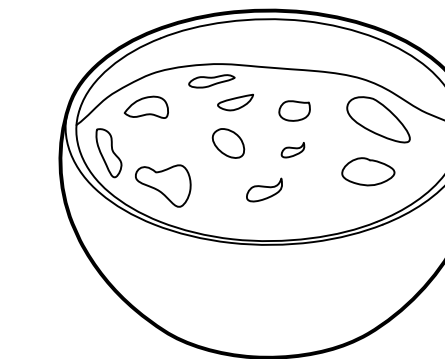
MIXTURE STIRRED AND HEATED UNTIL IT THICKENS



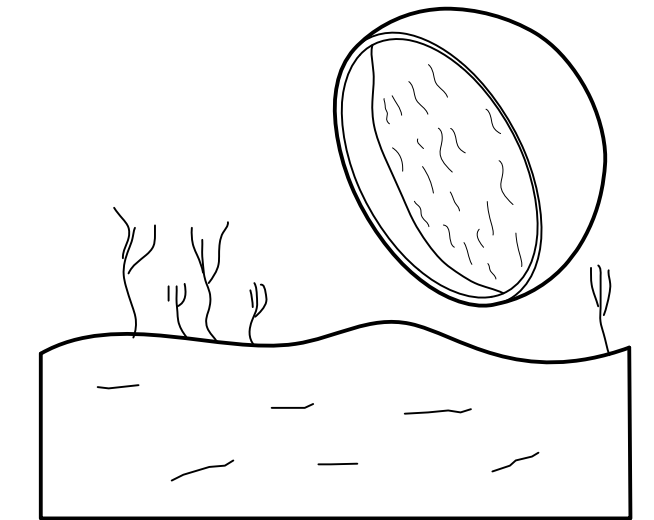
MIXTURE POURED INTO CONTAINER



GLUE STORED IN FRIDGE AFTER COOLING DOWN...



...OR ELSE MOLD WILL GROW ON TOP!



FLOUR GLUE CAN BE COMPOSTED AFTER IT GOES BAD