



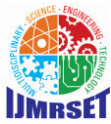
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Translucent Timber

Srimathi. K, Harshini. T, Subeetha. B, Soundharya. T M. E.,

Department of Civil Engineering, K.Ramakrishnan College of Technology, Kariyamanikam Road, Samayapuram,
Trichy, Tamil Nadu, India

ABSTRACT: A novel building material that goes by translucent timber was created to replace glass because of its poor thermal insulation and high carbon footprint. It is created by removing the lignin from balsa wood and adding a clear polymer resin to the cellulose scaffold that results. This material comes from a renewable resource, is shatterproof, and provides five times better thermal insulation than double-pane glass. It offers a long-lasting and environmentally responsible substitute for glass while drastically lowering heating and cooling energy usage.

I. INTRODUCTION

Translucent timber, an innovative bio-based material also known as transparent wood. It is chemically removing the lignin from natural wood and replacing it with a transparent polymer, such as epoxy. Unlike traditional materials like glass, translucent lumber provides various advantages for roofs, windows, facades etc. It maintains the natural, appealing grain of wood while allowing diffusion of sunlight into a building's interior, creating a soft, warm glow and reducing the need for artificial lighting. Its thermal insulation compared to glass, which can significantly improve building's energy efficiency. Its preserved fibrous structure also makes strong, tough, and shatter-proof, providing a safer and more durable alternative for building material. Its renewable resource and improving building's energy performance contributes a lower carbon footprint.

II. SCOPE OF PROJECT

Exploring translucent timber's composition and production methods. Considering its mechanical, structural, and thermal characteristics. Characterize the material's mechanical properties, confirming its claim of being shatterproof and stronger than glass. Compare its durability against Standard Glass and Advanced Triple- Glazed Glass. Delve into environmental advantages like carbon footprint reduction, energy savings, and sustainability.

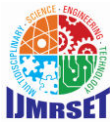
III. COMPETITIVE ANALYSIS

Feature	Translucent Timber	Standard Glass	Advanced Triple-Glazed Glass
Material Source	Renewable (Wood)	Non-renewable (Sand)	Non-renewable (Sand)
Thermal Insulation	Excellent (R-value of 5+)	Poor (R-value of - 1)	Good (R-value of 3-4)
Durability	Shatterproof, high strength	Fragile, shatters	More durable, can still break
Carbon Footprint	Low	High	High
Cost	Premium (Initial)	Standard	High

III. PROCESS

Step 1: Raw Material Selection

- Collect the balsa wood.



Step 2: Delignification (Lignin Removal)

- Remove the light-absorbing lignin from the balsa wood.
- This is typically achieved by heating the wood in a chemical bath.
- Key chemicals used for this process include **Sodium Hydroxide** and **Sodium Sulphite**.
- This process creates a porous cellulose scaffold.

Step 3: Bleaching (Optional but Recommended)

- Use a bleaching agent, such as **Hydrogen Peroxide**, to lighten the wood further.

Step 4: Cleaning and Drying

- The wood is prepared for infusion, sometimes using solvents like **Rubbing Alcohol**.

Step 5: Polymer Infusion

- Infuse the porous cellulose scaffold with a transparent polymer resin.
- A high-quality, clear **Epoxy Resin** is used for this step.

Step 6: Final Product

- The process transforms the opaque wood into a clear, strong, and highly insulated material

IV. EXPECTED OUTCOME OF TRANSLUCENT TIMBER

The expected outcome of a translucent timber project is the creation of a bio-based, renewable, and sustainable building material that combines the aesthetic qualities of wood with the transparency of glass.

The final product, also called transparent wood, is a composite material with several key characteristics:

- **High Transparency:** It allows a significant amount of light to pass through, making it a viable alternative to traditional glass.
- **Enhanced Mechanical Properties:** The material is stronger, tougher, and more shatterproof than glass.
- **Superior Thermal Insulation:** It has significantly lower thermal conductivity than glass, which means it can improve energy efficiency in buildings by reducing heat loss in winter and heat gain in summer.
- **Reduced Environmental Impact:** As it's made from a renewable resource (wood), it has a lower.

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