CelluWood

Co-funded by the Eco-innovation Initiative of the European Union

Laminated Strong Eco-Material for Building Construction Made of Cellulose-Strengthened Wood

PROJECT IN BRIEF

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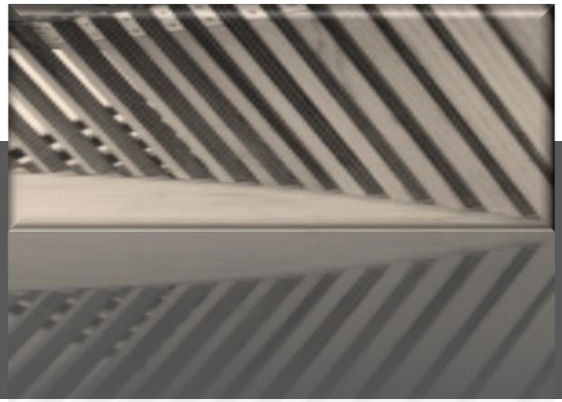
BACKRGOUND

Wood has been used in the past to build a wide variety of structures that have to withstand considerable static and dynamic loads, e.g. the stages and fly towers of theatres, railway bridges, ships, windmill sails,aeroplanes, watermill wheels and milling machinery.

In the 20thC, steel and reinforced concrete, have largely usurped wood for demanding structural applications. Steel and concrete are versatile engineering grade material that are relatively cheap to make and to procure. However, both materials impose significant environmental impacts, particularly in relation to water use, consumption of fossil fuels and CO_2 emissions.

The product proposed for development is strong re-engineered timber products strengthened by intimate bonding with reliably strong natural fibre composite reinforcing laminations so that it becomes suitable for use as structural framing.

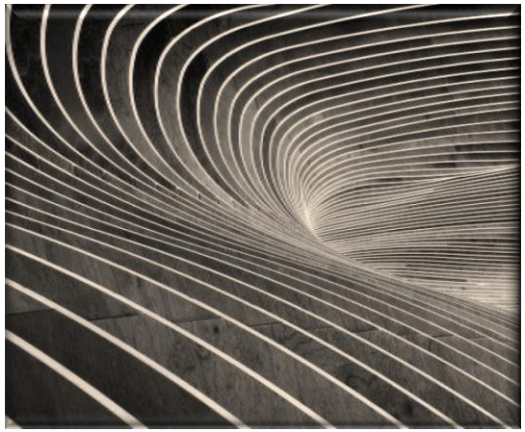


OUR OBJECTIVES

The specific objective is to bring into existence a new range of low carbon, reliably strong, eco-building construction materials (**CELLUWOOD**) made of wood.

The ‘physical’ results are strong eco-beams and columns and their most sustainable manufacturing technologies, in addition to significant environmental and cost benefits of the innovation.

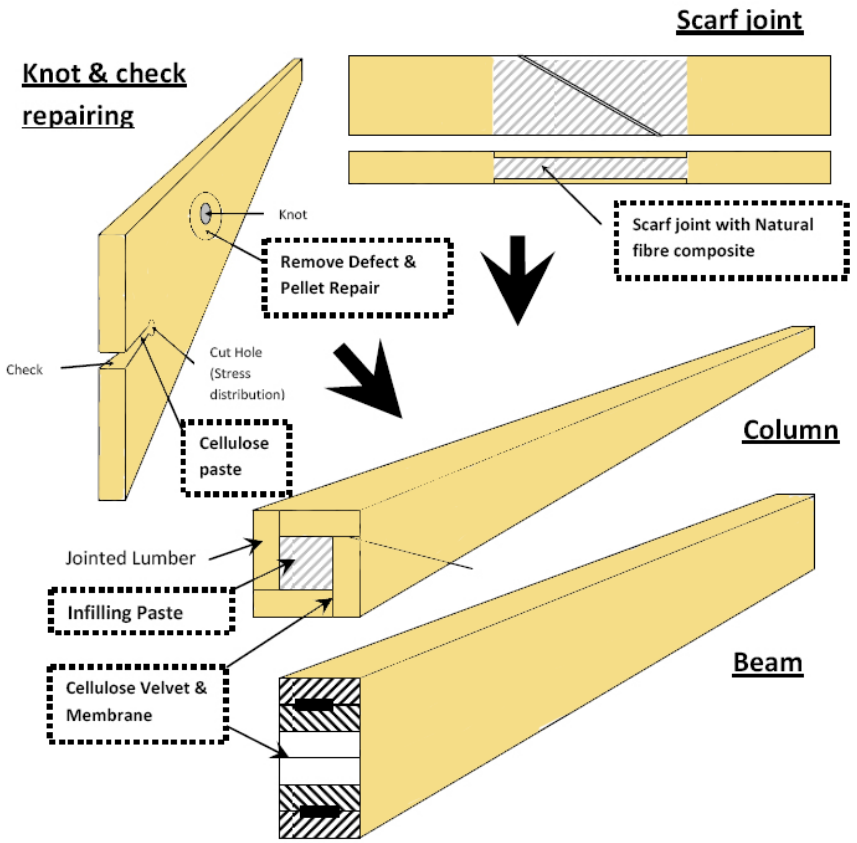
This is to create a major new market for reengineered wood, **CELLUWOOD** materials, in construction.



OUR SOLUTION

Use of novel cellulosic membranes instead of resin made from petro-chemical feedstock.

Where necessary, the sections would be strengthened by the addition of strategically located laminations of strong natural fibre composite (flax, hemp and nettle) in combination with bio-resin from natural resources.



OUTPUTS AND RESULTS

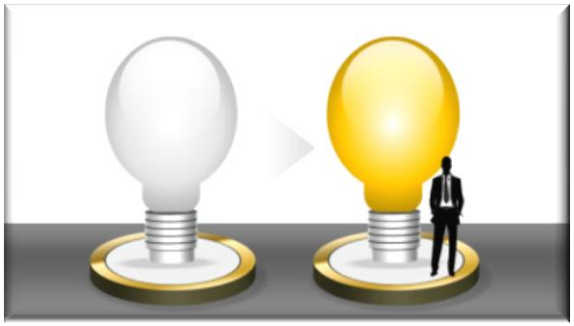
The new material (**CELLUWOOD**):

- Strong
- Lower the CO2 emissions intrinsic to construction
- Reduce massively the embodied energy in building carcasses
- Create new opportunities for carbon capture and storage
- Minimise thermal bridging through insulation layer and improve the possibilities for low-impact recycling of waste materials arising following a building's eventual demolition.

NOVELTY AND TECHNLOGY

The product will be entirely novel because:

- **it has not yet been possible to make natural fibre composites reliably strong enough for incorporation in building structures;**
- **it has not yet been possible to cross-laminate wood without recourse to use of strong, water-resistant glue made from petro-chemical feedstock and;**
- **it has not yet proved possible to deal with the natural knots, checks, shakes and grain defects in wood, which constitute locations of potential weakness, without cutting them out entirely and bonding in new, sound timber.**



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TARGET USERS/MARKET

The novel materials developed will firstly be used in building construction.

The construction sector represented around 10% of gross domestic product (GDP) of EU economy in 2009 despite the decline of the construction sector due to the financial and economical crisis last year.

Laminated timber currently holds a 30% to 35% share of the construction market, which is worth more than a billion euros.

PROJECT ORGANISATION

WP1 Consortium Management
•Financial Management
•Administrative Management
•Strategic Management
•Technical Management

WP2 RTD on Structured Boarding
•Assess Underutilized Wood
•Preliminary Process

WP3 RTD Bio-resin & Reinforcements
•High Strength Cellulose Membrane and Paste
•Bio-resin
•Natural Fibre

WP4 Development of Defect-free Lumber
•Repair Checks
•Repair Local Defect
•Develop Scarf Joint

WP5 Core Materials
Infilling Mixture
Particle Aggregate

WP6 Lamination Modelling
Beam Modelling
Column Modelling

WP7 Beam & Column Production
Beam Production
Column Production

WP8 Assessment of CELLUWOOD
•Characterisation of Glue-line
•Mechanical Properties
•Online Evaluation
•Moisture Resistance

WP9 Project Impact & LCA
•LCA Impact
•Inventory of LCA
•Cost and Eco-Efficiency Evaluation

WP10 Exploitation/ Business Plan
•IPR
•Exploitation

WP11 Dissemination After "CIPinnovation"
Plan
Pre-defined Task
International & National Disseminations

PROJECT CONSORTIUM

The project involves seven partners (six SMEs and one university), representing industrial research, manufacturing, design and dissemination.

- **InWood Developement (UK)**
- **Tecnifusta (Spain)**
- **Contemporary Building Design (Slovenia)**
- **Chimar Hellas S.A. (Greece)**
- **AIDIMA (Spain)**
- **Brunel University (UK)**
- **InnovaWood (Belgium)**

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Thank you

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