



NSERC innovation : hybrid structural wood composites for non-residential construction

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Auteur: Pirvu, Ciprian
 Collaborateur: Natural Sciences Engineering Research Council
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Résumé:

In recent years, significant attention has been paid to the engineering performance of wood structural systems, and a new generation of more reliable engineered wood components for building construction has evolved.

The latest trend is towards advanced products that combine wood and synthetics. This increases performance and structural reliability of engineered wood products, and leads to new markets and expanded opportunities. It is anticipated that cost of fibre reinforcement decreases over time and advances developed on reinforcing techniques and methods of evaluation would provide wood producers with more options to better position their products in the marketplace.

A new reinforcing technique has been developed and applied to manufacture a hybrid wood product for structural applications. The technique involves a layering analogy using layers of synthetic reinforcement sandwiched between layers of wood composite. The products manufactured in the laboratory used regular OSB laminations and alternating layers of E-glass fabrics and resin. Three- and four-ply billets were manufactured with various layouts and then tests were conducted to characterize mechanical properties of the hybrid products. Overall, the test specimens performed well relative to the controls. Shear failures were observed as a result of the limited performance of OSB in shear, and consequently the next tests will be conducted with plywood laminations instead of OSB.

Selected issues related to code acceptance of structural FRP-reinforced wood products are discussed in the appendix. Future work is suggested to completely characterize and understand the properties and behaviour of the FRP-reinforced wood products, including fire performance, long term durability, maintenance and cost, in order to establish an environment in which to work comfortably with such materials. Overcoming these issues is vital for product acceptance in building codes.

Composite materials - Physical properties

Composite materials - Research

Composite materials - Strength

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State-of-the-Art Report on Fibre Reinforced Polymer (FRP) Utilization in Wood Products

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State-of-the-art report on fibre reinforced polymer (FRP) utilization in wood products

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 Résumé: Fibre-reinforced wood systems are light, strong, stiff composites that can efficiently replace larger wood members and can be relied on to provide consistent mechanical properties.

This report is an introduction to fibre-reinforced wood systems for members of the Canadian wood products industry. It provides the motivation for reinforcing wood with synthetic fibres, and surveys the choice of materials and their uses. Numerous examples of current applications are discussed to demonstrate the strong and weak points of various approaches and examine the durability and management of fibre-reinforced wood products, as well as to indicate opportunities that exist for the Canadian wood products industry.

This report is intended to be a useful reference for the Canadian wood products industry, and assist future developments in structural and non-structural applications of fibre-reinforced wood products.

Composite materials - Durability

Fibres

Board products - Materials used

Documents



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