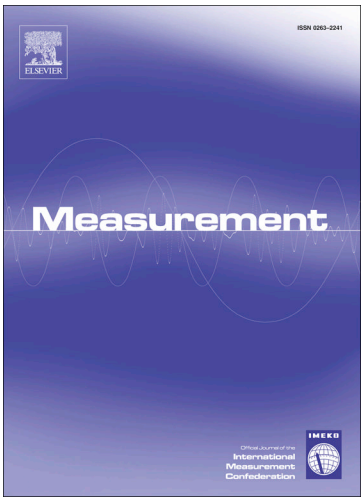

Characterization of Blockboard and Battenboard Sandwich Panels from Date Palm Waste Trunks

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Characterization of Blockboard and Battenboard Sandwich Panels from Date Palm Waste Trunks

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Abstract:

This paper presents investigation on the properties of value-added lightweight sandwich panels, blockboard and battenboard, made by date palm waste trunks as core layer combined with thin MDF as face layers. Some important physical, mechanical and thermo- acoustic properties of the panels were measured according to standard test methods and apparatus. Completely randomized design of experiments was planned and SPSS package was used for statistical analysis. Based on the experimental results, date palm wood-MDF sandwich panels with good thermal conductivity about 0.14W/m.K and favorable sound absorption up to 0.64 and noise reduction coefficients up to 0.15 can be used as heat and sound insulating materials. In addition, adequate physical and mechanical properties can be introduced date palm wood–MDF sandwich panels as a lightweight, cost-effective and environmental friendly alternative for wood- based panels for interior applications.

Keywords: date palm waste, lightweight sandwich panel, blockboard, battenboard, insulating material.

1. Introduction

Wood-based sandwich panels are important composite materials which can reduce the negative properties of solid wood for obtaining high-performance materials. These panels usually have excellent mechanical performance at minimal weight and they are very cost effective. They can be utilized in many industrial and residential applications including roofs, facades, walls, partition walls, and floors. A sandwich panel generally consists of three layers; a lightweight core material inserted in between two relatively thin, stiff, and high strength face layers [1]. The core usually resists shear stresses and the face layers bear flexural, axial, and dynamic stresses. Wood-based lightweight sandwich panels can be used in various modern and innovative constructions and designs. They have a great potential for development of optimized high stiffness and strength-to-weight ratio, and lightweight structures [2].

Blockboard and battenboard sandwich panels are usually made by softwood strips as core material. The strips are placed edge to edge and sandwiched between veneers of hardwood, fiberboard or plywood. The main difference between blockboard and battenboard is their strip widths in the core layer [3]. The core material of blockboard and battenboard can be obtained from relatively low-quality, small-diameter, and low valuable logs. Many building interior decorative and non-decorative items such as kitchen cupboards, skins for flush doors, lightweight doors, partitioning, exhibition paneling, kitchen cabinets, bedroom and dining room furniture, loudspeaker boxes, tables, entertainment center structures, and panel moldings maybe constructed by blockboard [4]. Some researchers such as Bowyer [5, 6],