Presentation Appraisal of PSL Wood Merged among Supplementary Wire Mesh

Dr.D.Sanjeevi, S.Nirmaladevi
Assistant Professor, Research scholar, Dept. of Mechanical Engineering,
Anna University, Chennai

Abstract

parallel strand lumber (PSL) being manufactured from full, parallel veneers, Parallel fiber uses veneers with more defects in a more random-looking outline. Laminated strand lumber (LSL) is a comparable type to facilitate uses smaller veneers, and so is similar to oriented strand board (OSB) in emergence. In 2012, North American LVL manufacturers shaped auxiliary than 43.4 million cubic feet (1.2 million cubic meters) of LVL in 18 different conveniences, and in 2013 the production amplified with more than 14%.i.e. modulus of elasticity (MOE) and modulus of rupture (MOR) are often concentrated. The aim of this cram was to evaluate MOE and MOR of OSB artificial with Pinus sp. and castor-oil based Melamine- Formaldehyde resin (MF) applying a wire mesh in regulate to get better those properties. The dissimilarity between parallel-to-grain MOE and MOR values of panels with and without wire mesh handling was not momentous. These values are finer to those suggested, for PSL and plywood, by normative credentials.

Keywords: *PSL, Melamine-Formaldehyde resin, Surface treated, Wire mesh*

I. INTRODUCTION

Wood, in the austere sense, is yielded by trees the consequence of cell distribution in the vascular cambium, an imaginative meristem, and successive development of the new cells. The common outcome of the water pleased upon the wood substance is to render it softer and more pliant. Contained by assured limits, the greater the water pleased, the greater it's softening effect. Ventilation produces a decided augment in the power of wood, predominantly in miniature specimens. Wood is a heterogeneous, hygroscopic, cellular and anisotropic substance. It is poised of cells, and the cell walls are poised of micro-fibrils of cellulose, and hemicelluloses , impregnated with lignin. The wood from conifers is called softwood, and the wood from dicotyledons is called hardwood. These names are a bit ambiguous, as hardwoods are not essentially hard, and softwoods are not unavoidably soft. The chemical composition of wood vary from genus to genus, but is in the region of 50% carbon, 42% oxygen, 6% hydrogen, 1% nitrogen, and 1% other elements by weight. Wood also contains sulfur, chlorine, silicon, phosphorus, and other rudiments in small magnitude.

An analogous fabric is parallel strand lumber (PSL), which is used in the some applications. Insincere from full, parallel veneers, Parallel wisp uses veneers with more defects in a more random-looking outline. Laminated strand lumber (LSL) is another similar type that uses smaller veneers, and so is similar to oriented strand board (OSB) in manifestation. Laminated veneer, parallel strand, and coated filament all belong to the general category of structural composite lumber. Laminated Veneer Lumber is cooperatively classified as structural composite shamble. It is frequently pretend in North America by companies that also invent I-joists. LVL is contrived to sizes companionable with the depth of I-joist framing members for use as beams and headers. Moreover, some manufacturers auxiliary cut LVL into sizes for use as chord-members on I-joists. In 2012, North American LVL manufacturers fashioned more than 43.4 million cubic feet of LVL in 18 different amenities, and in 2013 the construction enlarged with more than 14%. Because it is distinctively sized to work with I-joist floor framing, suburban builders and building designers like the combination of I-joist and LVL floor and roof assembly. LVL is a highly reliable building material that provides many of the same attributes associated with large sized timbers

Melamine resin or melamine formaldehyde is a stiff, thermosetting plastic material made from melamine and formaldehyde by polymerization. In its butylated form, it is dissolved in *n*-butanol and xylene. It is then used to cross-link with alkyd, epoxy, acrylic, and polyester resins, used in surface coatings. The purpose of this process was to produced and assesses the performance of PSL manufactured with *Pinus* sp. strands and castor oil-based melamine formaldehyde resin, whose surfaces were toughened with wire mesh. This wire mesh treatment aimed at increasing the mechanical properties in static bending of PSL.

II. MATERIAL AND METHODS

PSL boards in this revise were manufactured with strands of discarded wood pieces of Pinus sp with obvious concentration of 0.49 g/cm3. The solidity of *Pinus* sp is seal to that required for use in the assemble of PSL. Castor oil-based Melamine-formaldehyde resin was worn as an obligatory agent due to its exceptional presentation in panels. Galvanized wire mesh was engaged; their provisions are shown in Table 1. The use of a wire mesh was based on know-how from other fields that utilize wire meshesas strengthening, because make enquiries of this kind was is deficient with admiration to wood-based panels. A 16-mesh wire mesh was used because it presented the best result in introductory tests.

Table 1. Specifications of Meshes Used in the Manufacture of Panels.

Wire mesh (mesh)	Wire diameter(mm)	Opening the mesh(mm)	% Open area	Weight (Kg/m2)	Strength (MPa)
16	0,36	1,23	59,80	1,06	392-589

In order to manufacture the composites, following apparatus was worn: circular saw (i); chipper (ii); strand generator (iii); oven (iv); analytical balance (v); spray chamber (vi); strand separator (vii); mixer (viii); digital calliper (ix); heated hydraulic press.

Initially, rejected pieces *Pinus* sp. with moisture content near 13% was forwarded to carpentry, where they was sawn into 80 mm wide and 35 mm thick. These dimensions defined length and width of strands, which were generated by means of a disc chipper, whose knives had been adjusted to generate strands with thickness ranging from 0.40 to 0.80 mm (Figure 1).

Figure 1: Wood particle (Strands)

The chipper-generated strands were weighed and located in a scatter cavity, in which the obligatory agent was sprayed with the aid of an air compressor and two pistols. First, polyol was applied, followed by the prepolymer. The polyol/prepolymer weight ratio adopted was 1:1. Resin pleased for all panels was 12%, based on dry weight of strands. Adhesive-sprayed particles were placed in the barrier (Figure 2 & 3).Afterward, the strands were pre-pressed in direct to get better the mattress conformation and check loss of strand. Consequently, mattress was placed in a heated hydraulic press and subjected to a specific load of 4.8 MPa for 10 minutes at 100°C.

Figure 2: Polyol B1640

Figure 3: prepolymer A249

The wire mesh behaviour was conducted during animated terrible process, in which the wire mesh was fixed onto the section surface by means of load and temperature collective. Twelve panels were manufactured, four of which had the wire mesh pressed onto their top surfaces, four onto their bottom surfaces, and four onto neither of their surfaces (Figure 4).

Figure 4: PSL with Wire Mesh

After construct, panels were cured for 72 hours to ensure good presentation of the obligatory representative. It was adopted to emplace strands in the two outer layers and accidentally dispersed in the inner layer. The face/head/face ratio chosen was 20:60:20, based on the percentage of dry weight of adhesive-sprayed strands.

III. GRADES AND ARGUMENT

The regular parallel-to-grain modulus of stretch (MOE) values of panels affected in this study and those of panels for particular structural use in humid environment (OSB/4) invented in EN 300 are shown in Figure 5.It is potential to notice that MOE values for boards with and without wire mesh vary by 2% at most. Coefficients of variation (Cv) varied between 4.6% and 16.7%. This result may be credited to the fact that strands ruptured first, which caused the entire strain load to be transferred to the wire mesh, thus causing its crack. The Figure 6 shows parallel-to-grain modulus of burst (MOR) values for boards and compares them to those required by PSL/4.

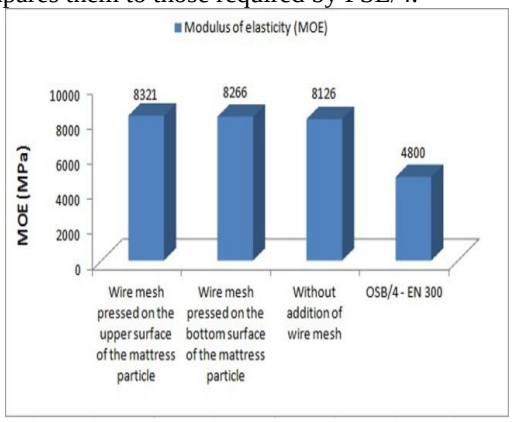

Figure 5: Parallel-to-Grain Modulus of Elasticity (MPa)

MOR values varied by 8% among panels at most and Cv values ranged from 8.3% to 22.6%. The pragmatic unvarying allotment of points along the line meets the regularly and homogeneity conditions required for validating ANOVA (P-value > 0.05).

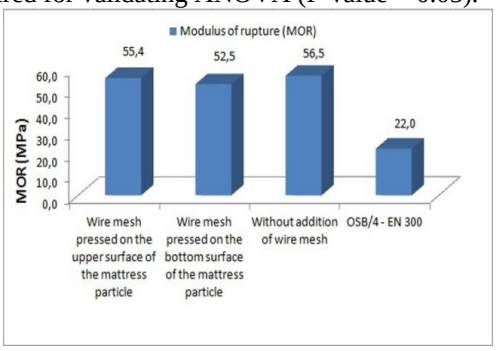

Figure 6. Parallel-to-Grain Modulus of Rupture (MPa)

In ANOVA, investigational MOE standards ranged from 5,846 MPa to 11,819 MPa. P-value of 0.838 indicated that the wire mesh location was not considerable with observe to MOE. Experimental MOR values ranged from 32.3 MPa to 74.7 MPa. P-value 0.304 indicated that the grave position did not authority MOR.

IV. CONCLUSIONS

Based on the tactic engaged and results obtained for PSL treated with wire mesh, it is potential to finish that: In static bending tests, the differentiation between parallel-to-grain MOE and MOR values of panels with and without wire mesh action was not considerable. Geometric analysis reveals that the wire mesh serious spot does not affect MOE and MOR. Nonetheless, these values are higher to those suggested, for PSL and plywood, by normative permit. In illumination of the above results, it may be confirmed that while the relevant of PSL with wire mesh, *Pinus* sp. wood strands and castor oil-based Melamine-formaldehyde resin isn´t viable. The use of wire meshes becomes sun needed because the trimmings of MOE and MOR were inappropriate. However, PSL without wire mesh showed brilliant results when compared to the values required by the convention cited.

REFERENCES

[1] Amós Magalhães de Souza, Fabiane Salles Ferro, Felipe Hideyoshi Icimoto, Diego Henrique Almeida, Marília da Silva Bertolini, André Luis Christoforo , Francisco Antonio Rocco Lahr, International Journal of Materials Engineering , Performance Assessment of OS Wood Composites with Added Wire Mesh ,4(3): 88-91,2014

[2] P. Feraboli Notched response of OSB wood composites. Compos Part A – ApplSci, 39, 1355–1361, 2008.

[3] M. S. Bertolini.; F. A. Rocco Lahr.; M. F. Nascimento.; J. A. Agnelli. Accelerated artificial aging of particleboards from residues of CCB treated *Pinus* sp. and castor oil resin. Materials Research, 16, 293-303, 2013.

[4] European Standard. EN 300: Definitions, classification and specifications. Portugal. 2006.

[5] A. J. P. Silva.; F. A. L. Rocco.; A. L. Christoforo.; T. H. Panzera. Properties of Sugar Cane Bagasse to use in OSB International Journal of Composite Materials, 2, 50-56, 2013

[6] S. A. M. Silva.; A. L. Christoforo.; S. L. M. Ribeiro Filho.; L. D. Varanda.; F. A. L. Rocco. Particleboard Manufactured with Bicomponent Polyurethane Resin base on Castor Oil International Journal of Composite Material, 2, 115-118, 2012.

[7] A. M.Souza. Productionand performance evaluation of *Pinus* sp oriented strand board (OSB) with metallic gauze inclusion. Ms thesis. São Carlos: University of São Paulo, 2012.