COMPREHENSIVE COMPARISON OF THE UNDERUTILIZED WOOD SPECIES FOR MANUFACTURING LAMINATED STRAND LUMBER

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INTRODUCTION

Laminated strand lumber (LSL) is one of the high yield new enginered wood product (EWP) used as structural composite lumber, consisting of oriented wood strands up to 300 mm long that are bonded and compressed to form panels up to 90 mm in thickness. LSL shows superior mechanical properties with less variability than solid lumber of the same species [1]. It is used almost in all structural applications like lintel, beam, joist, ceiling, floor, rafter, etc. [2][3].

Properties of the LSL are dependent on the density of the panel, wood species, strands geometry, adhesive, and the orientation of the strands [1]. The main aim of this study was verification of the LSL manufacturing from new wood species with the different adhesives.

MATERIAL AND METHODS

The debarked logs were cut into 300 mm long cutouts the length of the strands for LSL. The cutting process (moisture content and temperature of the logs, rotation speed, and knife space) was optimized for the Norway spruce (Picea abies L. Karst). The pressing parameters and the strands orientation were optimized for the pMDI and MUF adhesive.

The physical properties of the LSL were measured (moisture content (MC), density, distribution profiles (DP), thickness swelling (TS), water absorption (WA)). The bending properties (modulus of elasticity (MOE), modulus of rupture (MOR)) of LSL were tested.

Figure 1 Laboratory manufactured strands

RESULTS

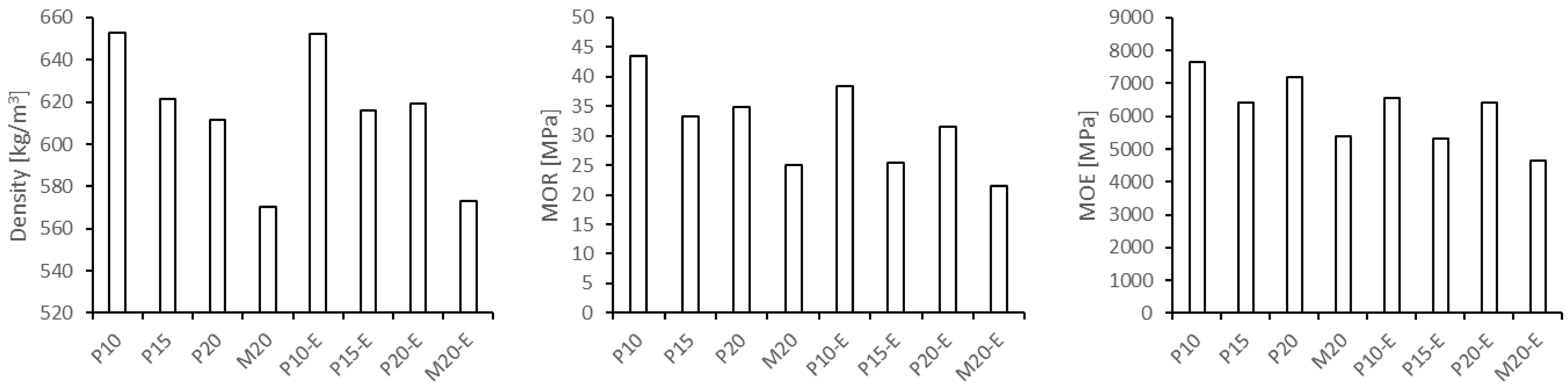

Figure 2 Physical and mechanical properties of spruce LSL manufactured with different adhesives (P-pMDI, M-MUF), different moisture content of the strands after resin application (10, 15, 20 %) and flatwise and edgewise (E) testing.

The statistically significant difference was observed between different types of adhesives for density measurement.

Bending properties of LSL for edgewise and flatwise testing showed similar trends for the MOR and MOE. Specimens manufactured with the lowest MC of the strands after resin application showed the highest bending properties. The specimens with the MC after resin application 10 and 20% for pMDI resin showed higher MOR for flatwise and edgewise specimens.

CONCLUSION

- There is a huge potential for the manufacturing of the LSL from the Norway spruce
- Specimens manufactured with pMDI resin and 10% MC after resin application showed expected results with the highest density, MOR and MOE.
- MUF resin showed significantly lower density and bending properties.

ACKNOWLEDGEMENT

This work was supported by the Specific University Research Fund of the FFWT Mendel University in Brno (Grant No. LDF-22-TP-005).