

## Abstract

The mechanical strength of wooden chair can be changed by number of joints and dimensions parts. The aim of the study is manufacturing in first stage, the chair from small-diameter poplar and then, evaluation its mechanical strength. Main members were assembled at six type patterns by mortise and tenon joints. Dimension parts of chairs manufactured by smaller component which glued together at length, thickness and width. Smaller component jointed together with finger joint in longitudinal direction, and with edge to edge, and face to face in the direction of width and thickness. Front to back load test on seats is based on the standard DIN EN 1729-2. The results show that the maximum load of chairs made from solid wood is 1019.67N. Whereas strength of the chairs made from timbers of small size which glued together as end to end, edge to edge and face-to-face is 956 N. Chairs made from the overlayed timbers (face to face joint) have more strength (977.33N) than other chairs that the timbers of small size glued together with finger joints (end to end joints) and edge to edge (879.666N). Second stage, to increase the strength of the corner inhibitors piece of chairs was next frame. Wooden chairs with inhibitors made of poplar wood with wooden seat without Inhibitors made of poplar wood were compared. The results showed that the piece inhibitors increases the mechanical strength, and flexural bond is flexural and flexural bond becomes chairs. Three stage, Starving the joint and surfaces of glue line is responsible for this decreased strength. Compressed poplar wood was applied to strength improvement of wooden chairs with two joints. These chairs were compared to chairs made from uncompressed poplar wood. Wooden chairs made with two types of traditional joints include mortise and tenon joint and wooden pins. The maximum force applied of front to the back seat, were recorded based on Library Society of America. The results showed that using the compressed poplar wood in making the chair on its strength is significant effect at 95 percent and cause of increasing the strength. Strength increased to 57.5 percent at chair made from compressed poplar wood and joint of mortise and tenon when compared to chair contains raw poplar wood and this joint, and also, the strength increased to 64.12 percent at chairs made of compressed poplar wood and dowel joints when compared to chair contains raw poplar wood and dowel joints. Joints of chairs made from raw poplar wood dislocated at back frames, but joint elements of chairs made from compressed poplar wood have lower move than other, and then the failure occurred at back frames. Generally, the chair made of compressed poplar wood and with mortise and tenon joint has the highest mechanical strength. Wooden chair strength was improved by modification of wooden elements.

**Keywords:** wooden chair, small-diameter poplar, dowel joints, mortise and tenon joints, compressed poplar wood.



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**Effect of joints number and layer  
arrangements of elements on mechanical  
behavior of chair made from small diameter  
Poplar timber and Methods improving the  
resistance of chair**

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