

ABSTRACTS (MASTER THESIS)

Semi-defibration of wood as pretreatment for wood flow forming – The effect of semi-defibration on penetrability of wood

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Introduction

Wood flow forming is a new method in which wood block is processed into product with three dimensional shape. The forming process includes the heating, pressing, and cooling in a mold. In this process, wood block is separated at around intercellular layer into smaller parts, and subsequently flown into the empty space in the mold. The separated parts are re-bonded to each other and then fixed. The flowability of wood and the physical properties of products, however, is required to be improved. One of the representative techniques to improve such properties is the impregnation of wood with a given resin. It is necessary to solve the issue as to the irregular distribution of the resin in wood.

Semi-defibration by extrusion of wood before the impregnation is devised to solve this issue. The purpose of this study is to investigate the effect of semi-defibration on penetrability of wood and the influence on the length of cells which largely affect the mechanical properties of products.

Materials and methods

At first, a column specimens (height (R direction) is 50 mm, and diameter (L, and T directions) is 45 mm) was cut from a transverse-heart-wood of yellow cedar (*Chamaecyparis nootkatensis*) whose all dried specific gravity was 0.51. And then, it was treated with the condition of 20°C, 98%RH until specimen's weight became constant. After that, this specimen was steamed for 15 min, and put into a die which is heated to 120°C, then offered to extrusion for semi-defibration. The defibrated wood and column specimens as control were all dried by 105°C oven drying, and then impregnated the phenol-formaldehyde resin (PF resin, which was prepared for 30 wt% by diluting with water) by vacuuming and compressing. Next of that, resin-impregnated woods were cut at center line, and the cut faces were observed. And more, for investigating the state of destruction of cells, they were separated by Wise method, and measured their length.

Results and discussion

Figure 1 shows the cut faces of PF resin-impregnated woods. In column specimens (a), PF resin was hardly impregnated into wood. On the other hand, in semi-defibrated wood (b), PF resin was impregnated into even inner part. As this reason, it is suggested that semi-defibration was effective for improving the impregnation ability of wood. Also, the average length of cells of column specimen and semi- defibration wood are shown in Table 1. In this table, significant difference is not confirmed between the two values. From this result, it is suggested that notable destruction of cells by conducting semi-defibration was not happened.

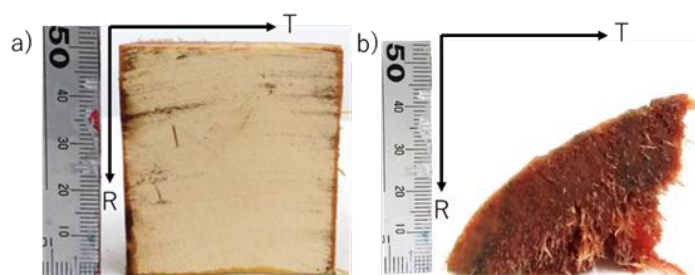


Figure 1. The cross sections of impregnated wood
a) column specimen b) semi-defibrated wood

Table 1. Average length of cells of column specimen and semi-defibrated wood

	Average length of cells (mm)	S.D. ($n = 100$)
Column specimen	1.99	0.90
Semi-defibrated wood	1.86	0.97

S.D. : standard deviation