Preliminary

Rheological Properties of Laminated Veneers During Hot-Pressing*[1]

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Introduction

It is well-known that wood deforms much more under the unsteady state of both moisture and temperature than at the constant conditions[1]. This property plays an important role during the production of wood-based materials, especially when hot pressing is involved. In this process, both the moisture movements and the temperature changes during hot pressing occur radically at the same time. However, because of some complexities of doing such experiments, limited studies have so far been reported on the deformation property of wood during hot pressing.

This paper deals with the creep property of laminated veneers during hot pressing. In addition, the compression set of the veneers after hot pressing as affected by the moisture and heat flow was determined and discussed.

Materials and Methods

Veneers from seraya (*Shorea* spp.) with a thickness of ca. 1.2 mm and with moisture contents ranging from oven dry to the fiber saturated point were used. After the initial measurements of moisture content and veneer thickness, 10 plies of laminated veneers were hot-pressed under 120–160°C and at pressures varying from 4 to 16 kgf/cm^2 considering press times of 30 to 600 sec. It should be noted that no binders were applied among the veneers. The total thickness of the 10-ply laminated veneers and the temperature in each layer were measured simultaneously during hot-pressing. After hot-pressing, veneers were immediately delaminated, and the weight and thickness of each layer were measured. The

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moisture gradient and thickness deformation of each layer were then calculated. Calculations were based on the measured initial and final weight and thickness.

Results and Discussion

An increase in the initial moisture content (MC) of the specimens and compressive stress applied resulted to an increase of the creep strain during hot-pressing. When the press temperature was 140°C, the creep strain increased dramatically until press times of 100 sec regardless of the applied pressure and then gradually continued to increase beyond 100 sec. Small increases of strain were observed at 0% MC. It was noticed that under the same initial MC and the same pressure, a rapid increase rate of deformation occurred until 100 sec when the press temperature was increased to 160°C. However, the same value of the total strain after 600 sec was observed as at a press temperature of 140°C.

Figure 1 shows the relationship between the residual strain and the moisture content change of each veneer at various condtions of the initial MCs and the pressing temperatures. In this case, the term "residual strain" means the rate of deformation measured after hot-pressing. It was found that the moisture movement and the temperature changes in each layer were different from one another. It was also realized that at a constant pressure, the increase in strain was proportional to the moisture change regardless of the initial MC, the pressing time and the temperature. In addition, the residual strain was found to be proportional to the compressive stress. Based from the results observed, it can be

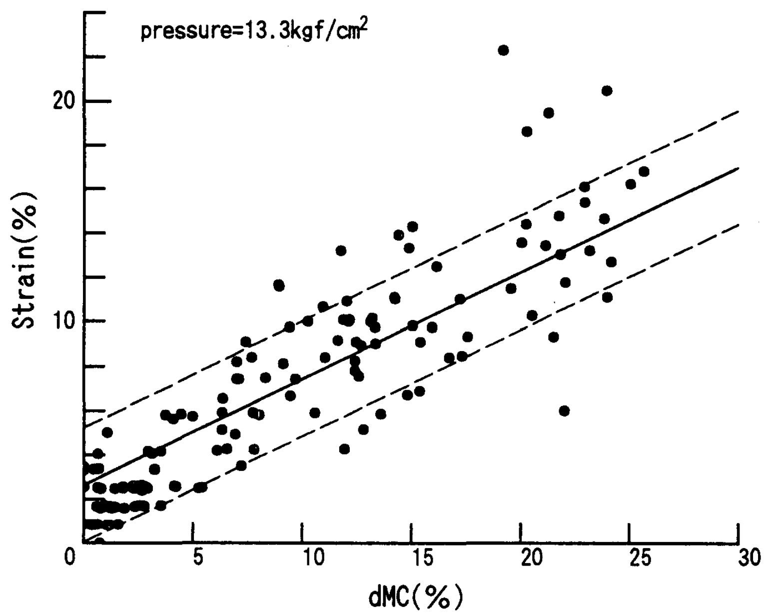

Fig. 1. Relationship between the residual strain and the moisture content change (dMC) of each veneer at various conditions of the initial MCs and the pressing temperatures.

concluded that the deformation as affected by both moisture movement and temperature change is influenced largely by the moisture change and the compressive stress.

Reference

1) M. Norimoto: Wood-bending in Microwaves, *Wood Research and Technical Notes,* No. 14, 13–26 (1979).