

# TECHNICAL NOTES

FOREST PRODUCTS LABORATORY

U. S. FOREST SERVICE

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## PREPARATION OF STOCK FOR BENDING

To render wood pliable, both moisture and heat are required. Neither of these factors is fully effective in the absence of the other. There should be moisture enough, experiments at the Forest Products Laboratory indicate, to saturate the cell walls, which amount is equivalent ordinarily to a moisture content of 20 to 30 per cent. No better effect is noticed where there is additional water in the pores or open spaces of the wood. The pliability of wood apparently increases quite rapidly with increase of temperature. Very high temperatures, such as accompany steam under pressure, however, are not advisable, since they render the wood brash; in fact, boiling for any length of time permanently reduces the strength and toughness of wood to small fractions of their normal values.

Freshly cut stock is, of course, thoroughly saturated and needs no additional moisture. Only heat is required to produce flexibility. If the stock has dried for a long time, it will have a uniformly low moisture content throughout, probably about 12 to 15 per cent. Such material requires the addition of a considerable amount of moisture before it is in proper condition for bending. If the stock has dried for a shorter period, the interior part may be at a high moisture content while the exterior surfaces are quite dry. Such stock needs the addition of sufficient moisture to bring each part of it up to about 25 per cent.

Condensation of the steam may not furnish sufficient water if the stock is very dry; in this case the addition of a hot-water spray to play on the stock in the steam box would be advantageous. Admission of the steam through water will insure its being thoroughly wet. Pressure steam probably adds little if any to the moisture content.

During steaming, the stock should be so piled that steam has access to all sides of each stick.

The following is an extract from an interesting letter recently received at the Forest Products Laboratory from a chair manufacturer, regarding the preparation of stock for bending in a hot press:

"We use a horizontal retort for steaming our wood before bending. We previously had been using fairly green lumber with a high moisture content steaming it with live steam about 30 to 40 minutes at 5# to 10# pressure and then bending. Our breakage averaged around 15 per cent on lumber about 11/16 inch thick. Recently we experimented along the lines of filling the lower part of the retort with water, through which the steam had to pass, and raising our grates to keep the material out of the water. We found by experiment that we got the best results by this method and by carrying no pressure on the inside of the retort and steaming about 4 hours before bending. In this way, on lumber "bending dry", we reduced our breaking to about 5 per cent. We have just bent some 3/4" mahogany (Cuban) over two years old in this way, with about 10 per cent breakage."

Another manufacturer states that in the hot-plate bending of red gum chair posts, he has recently improved his output by spraying the stock with hot water while in the steam box.