WASTE IN VENEER MANUFACTURE
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Wastes in hardwood veneer and plywood production equal or exceed those of the lumber mill and, under existing conditions of veneer log scarcity and high prices, emphasize the need for more economical production methods. Recent findings of the Forest Products Laboratory based on studies of yellow birch veneer production at commercial mills have demonstrated that veneer manufacture is not the economical means of utilizing logs that it is often supposed to be. It takes an exceptional yellow birch veneer bolt 6 feet or longer to yield 60 percent of its cubic volume (after removal of the bark) in merchantable veneer; the average log yields 47 percent. To this waste must be added the 50 percent loss reported by plywood manufacturers in converting hardwood veneer into plywood.

While any exact comparison of veneer and lumber yields would require detailed mill studies, using woods-run logs, the Forest Products Laboratory analysis of yellow birch production at two Wisconsin veneer plants revealed waste approximating Forest Service figures often quoted for sawmill waste. No effort was made in these studies to work out more economical production methods, but it is believed that economies effected in Europe, where high material costs have long been prevalent, might find adaptation in United States mills.

In the Forest Products Laboratory veneer waste studies, the veneer log was considered to yield just two things: veneer (other than container veneer) and waste. Summarized, the results of these studies are presented in the following paragraphs.

Kinds of Waste

Trim-off waste.—One hundred aircraft veneer logs yielded 222 bolts averaging 85 inches in length. Trim-off (to eliminate defects and to obtain the exact bolt lengths required) ran up to 18 inches and averaged 7 inches per log, or 3.7 percent of its cubic volume.

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Excess length in veneer bolts.—Veneer bolts were cut 3 inches longer than the required veneer sheet. This left a small allowance to take care of stain, end checks, and lack of squareness at the ends of the bolts. The excess length was removed by means of two small fixed knives, one near each end of the lathe. This waste amounted to 3.5 percent of the log's cubic volume.

Rounding waste.—This is the waste involved in turning the typical unsymmetrical veneer block to a cylinder in the lathe. Only when this stage is reached is veneer produced in a continuous sheet free from voids.

With rare exceptions, even the best birch veneer blocks are far from cylindrical. In this study, for instance, they were not circular in cross section. Measurements of several hundred showed an average difference of three-fourths inch between the long and short diameters at the small end. The veneer blocks were not straight, 100-inch lengths having an average sweep of 1 inch. Taper averaged 2 inches in 100-inch blocks. As a result of all these factors the rounded diameter averaged only 14.3 inches as compared with 16.5 inches for the short diameter at the small end, a reduction of 1.7 inches. Large as this reduction seems, it was checked at other plants and found to be typical.

When rounding begins, a great many scraps too small to be of any use are produced. As rounding progresses, the voids become smaller and the pieces of veneer become larger until they reach a size that is worth saving. Slightly more than half of the veneer that was produced in rounding was scrap and the rest, after clipping, was marketable. In this study the rounding losses amounted to 17 percent of the cubic volume.

Clipping waste.—As the green veneer comes from the lathe, it is put through the clipper, which cuts it into rectangular sheets. There are irregular pieces produced during the rounding operation, to be squared, diagonal edges to be squared, and (as the core is approached) numerous defects to be clipped out. Waste is increased if only a few specified widths are acceptable. Widths in this study varied from 10 inches to 50 inches, but about two-thirds of all veneer sheets were 24 inches wide or less. Waste in clipping averaged 12 percent of the cubic volume of the block.

Cores.—Cores averaged 8 inches in diameter and comprised 18 percent of the cubic volume of the veneer block. They could have been turned smaller, but by the time an 8-inch diameter is reached in yellow birch the veneer is usually too defective for anything but containers. Container veneer in the northern Lake States region is customarily made at separate veneer mills that use only low-grade logs. Cabinet veneer plants have no use for container veneers except for a small amount that is used to protect high-grade veneers in transit.
Handling and Drying Wastes

Waste from all the above sources totals 54.2 percent, exclusive of bark. These, however, are only the wastes met with in converting the selected log into green veneer. Further losses occur from damage during handling and drying of the veneer, but data were not obtained on these factors in this study. Less waste would be expected in yellow-poplar and sweetgum than in yellow birch because the logs run larger and more symmetrical in those woods. For the same reasons, still less waste would be encountered with Douglas-fir "peelers."

The wastes discussed here are not a total loss. Hogged scrap veneer feeds the boilers, although at $100 per thousand feet for logs it is expensive fuel. Cores are usually sawed into 1-inch boards and used to crate veneer shipments which would otherwise be crated with purchased lumber.

European Waste Reduction Measures

A common European practice that is slowly coming into use in this country consists in winding hardwood veneer onto a reel directly from the lathe. The reel is taken to the clipper and the veneer is unwound, clipping one thickness at a time as contrasted with our common practice of tearing off long sheets at the lathe and clipping several thicknesses at a time. Substantial reductions in clipping waste are reported. A different method of reducing clipping waste is employed at other plants, where veneer is dried in relatively long sheets before it is clipped, thereby saving waste resulting from a second clipping.

European veneer manufacturers find it practical to save smaller pieces than are customarily saved here in the United States and to watch waste more closely all along the way. This, of course, is partly due to the fact that material is relatively costly in Europe and labor relatively cheap. Current veneer log prices and scarcity, however, may well justify going farther to conserve material in this country than was formerly considered practical.

Plywood Waste

Plywood manufacturers report a waste of about 50 percent in converting hardwood veneers to plywood. This makes a total waste from the veneer log to the finished plywood sheet substantially greater than is encountered in lumber manufacture. Detailed figures as to just how and where this waste occurs in converting veneer to plywood are not available, but certain losses are obvious. There is breakage, reclipping of dry veneer sheets to get straight edges, jointing where sheets are to be edge glued as for numerous
war uses, trimming off of corners where veneer is laid at a 45° angle, and so on. A plywood sheet that was sold as 48 inches by 96 inches in dimension was originally glued up as 50 inches by 98 inches and thus suffered a 5.6 percent loss in size when trimmed to exact size. This trimming waste is still larger on a percentage basis in smaller sheets. Plywood is sanded before shipment and thus loses one thirty-second of an inch of its thickness in hardwoods or one-sixteenth of an inch in Douglas-fir. Assuming the sheet to be five-sixteenths of an inch thick originally, the sanding operation alone would cause a loss of 10 percent in hardwoods or 20 percent in fir. Manufacture of veneer and plywood makes the good logs go farther by spreading them thinner, but it does not get the maximum volume of usable material out of the log.