FOREST PRODUCTS LABORATORY † FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE

.482323 Variation and allowances

SMALL SAWMILL IMPROVEMENT

PRACTICAL POINTERS TO FIELD AGENCIES

WASTE FROM VARIATION IN SAWING PRECISION

A major loss sustained by small mills results from inaccurately cut lumber. The product brings less per thousand board feet and encounters stiffer sales resistance than that from the more accurately cutting band mills. A more obscure loss is the excessive manufacturing waste that results from inaccurate cutting.

Studies* by the Forest Products Laboratory indicate that the portable-mill operator, in sawing for thickness, cuts only about 20 percent of the boards within 1/32 inch of the thickness he sets for. The remaining 80 percent may vary in thickness from as much as 8/32 inch on the thin side to as much as 5/32 inch on the thick side. (Fig. 1, upper pile.) Consequently the operator must set to cut most boards too thick so that there will not be too many that are excessively thin. Each 1/32 inch thus added to avoid thin boards reduces the possible cut exactly as if the saw kerf were increased 1/32 inch. This waste can be minimized by keeping the equipment in good condition.

The main causes for inaccurately cut lumber are: (1) Faulty condition of the saw, such as uneven filing of saw teeth, excessive or uneven swage, dull teeth on one side, unequal tension; (2) worn bearings in mandril, carriage wheels, and particularly in the set-works; (3) poor installation of carriage and saw, chips between log and headblock or on track; (4) careless setting, inadequate manipulation of dogs, miscalculation resulting in the last board cut from each log being either undersized or oversized; (5) frozen timber, unusual stresses in wood. These will not be elaborated upon now.

By adjusting the saw, carriage, and track for the most accurate work possible, sales advantage due to more accurately cut lumber is obtained. To get the second advantage, an increased yield, set to cut all boards thinner. Note that two steps are essential: (1) Adjusting to improve cutting accuracy and (2) setting for thinner lumber. The number of thin rejects will not be increased because the effect of truing up equipment is to bunch boards closer to the intended 1/32-inch group and thus to decrease the number of extremely thick and thin boards. (Fig. 1, effect of improved cutting accuracy shows in middle pile. If 28/32 inch is taken as the thinnest rough dry thickness that will produce the softwood standard 25/32 S2S, the set-works can be moved either by 1/32-inch intervals or, where the intervals are 1/16 inch, by placing a 1/16-inch leaf in the back stop so that the entire cut is 3/32 inch thinner. Lower pile. The consequent increase in yield is 4-1/2 percent.)

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† Maintained at Madison, Wisconsin in cooperation with the University of Wisconsin

*See outline in Small Sawmill Improvement Working Plan, March 1930, for explanation of indexing system proposed

The ideal setting does not attempt to qualify every board but rather to set for thinner boards until a point is reached where the gain from increasing yields is balanced by the loss from thin rejects. This balance is reached when a 1-1/2 percent increase in rejects results from setting 1/32 inch thinner, hence continue to set thinner by 1/32-inch intervals until the number of thin rejects increases by more than 1-1/2 percent over the previous setting. The ideal adjustment is 1/32 inch thicker than this setting.

Thin rejects for each setting can be determined by measuring to the nearest 1/32 inch at the thinnest place, exclusive of the terminal foot, a hundred freshly sawed, nominally 4/4-inch boards. The number of boards less than the thickness required to meet standard specifications plus an allowance for shrinkage in drying is the total percent of thin rejects. Consequently when the rejects from setting 1/32 inch thinner increase two or more boards per hundred set for the next thicker 1/32 inch.

SOFTWOODS

An allowance of 1/32 inch must be made for shrinkage of inch softwood lumber from a green to the equivalent of a thoroughly air-dry condition. Moreover, most softwood grading rules admit 20 percent 28/32-inch rough dry lumber; hence, the 29/32-inch green lumber group is the thinnest to qualify. A mill cutting lumber as in the upper pile in Figure 1 should therefore set 1/32 inch thinner, since the 1-1/2 percent increased yield is but partly offset by the 1 percent increase in rejects. For a mill grouping its cut as in the lower pile in Figure 1, a 1/32 inch thinner set, although gaining the 1-1/2 percent increased yield, results in an increase of 3 percent in rejects.

HARDWOODS

The set-up for hardwood differs in that 2/32 inch must be allowed for shrinkage (3/32 for beech and hickory) and the grading rule base is 32/32 inch for rough dry lumber so that 34/32 inch is the thinnest green board to qualify. A mill grouping its cut as in the upper pile in Figure 1 for hardwoods should set four places thicker, so that the 2 percent shown in the 30/32-inch group would be in the 34/32-inch group.

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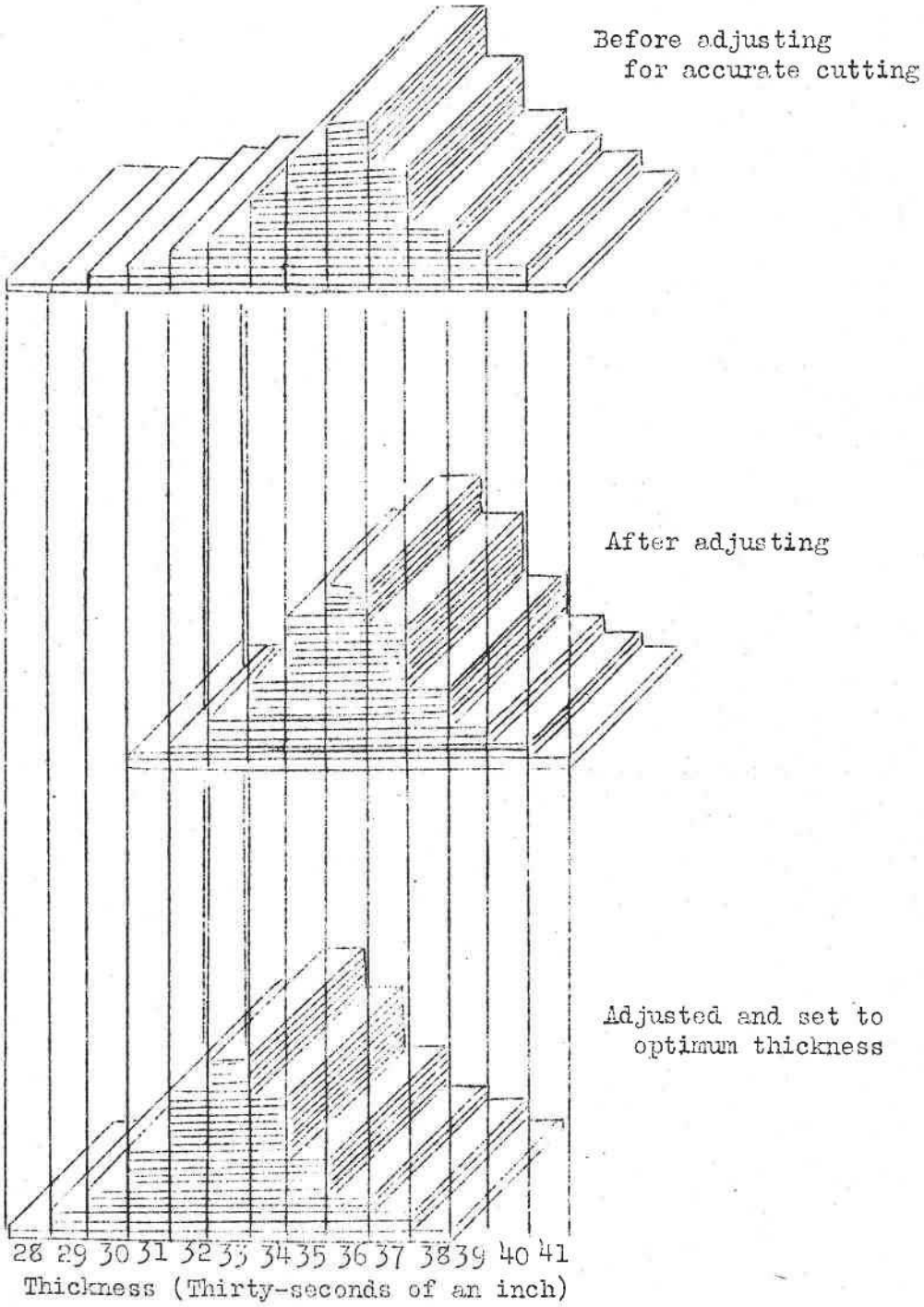

Figure 1.--Example of variation in thickness of each 100 boards of inch lumber as cut at portable mills

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