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TECHNIQUE FOR ESTIMATING YIELD OF FURNITURE SQUARES AND FLAT STOCK FROM FLITCHES

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Abstract. A grading technique developed to predict the yield of furniture squares and random-width stock from flitches is presented.

INTRODUCTION

There is increasing pressure on the processor of forest products to make better use of the portion that he is able to procure. The reason, quite obviously, is that the cost of the raw product has risen substantially along with a greater demand for it. Therefore the producer must correctly allocate his share of the raw material to the most profitable end use if he is to remain competitive.

In the use of bolts, if flitch production is an intermediate step, then the allocation for the flitch as well as for the log and bolt is critical in the profit picture. This note describes a method to predict the yield of furniture squares or random-width flat stock to be processed from flitches.

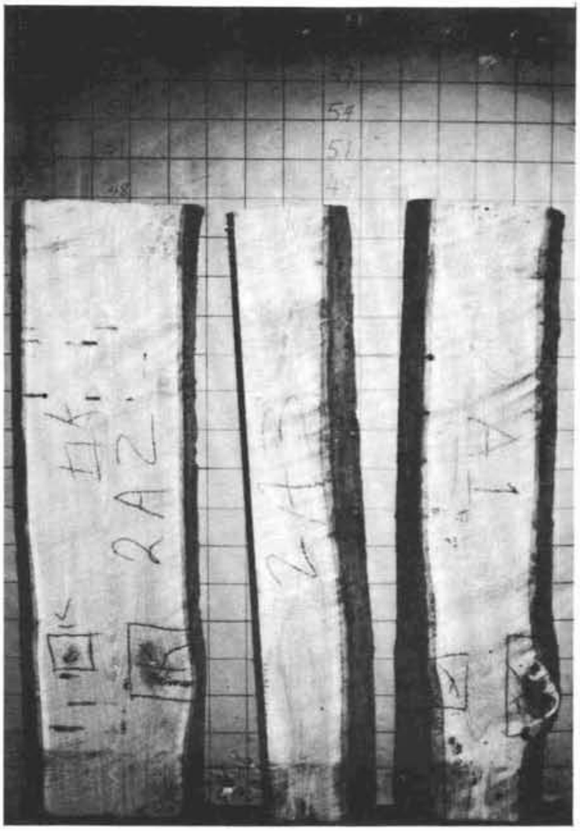
DATA AND PROCEDURE

The flitches used were part of a cooperative study in southwestern New York. Eighty northern red oak logs were sawed into 210 bolts of 37-, 43-, 48-, and 60-inch lengths ranging in diameter from 8 to 19 inches. The bolts were then processed into 1,619 flitches.

Rather than diagraming each flitch, three to four flitches at a time were positioned against a large grid marked off in 3- by 3-inch squares and photographed (Fig. 1). The side of the flitch with the most defects faced the camera and defects from the reverse side were marked on the poorer face with a lumber-marking crayon. A log-bolt-flitch number was marked on each flitch.

After the flitches were kiln dried, a

Figure 1.—Photographic grid system for measuring flitch and defect size.



randomly determined sample of 69 bolts was selected. The sample consisted of 36 bolts processed into 189 flitches (8/4-inch thick) and 33 bolts processed into 264 flitches (6/4-inch thick). The flitches were then cut into square stock or random-width flat stock, according to the dimensions listed in Table 1. The tally for the squares was a piece count by length, and for the random width, actual measurements by length were made.

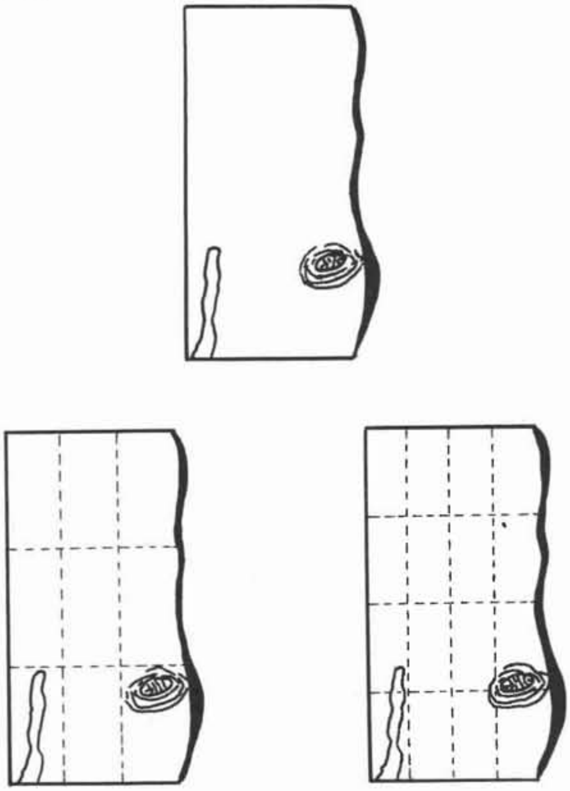
Table 1.—Square and flat stock dimension sizes, by thickness

Square length		Random-width length	
8/4	6/4	8/4	6/4
inches			
37	37	28	20
33	35	25	18½
30	32	22	17½
28	15	18	15
25	14	17	14
22		15	
18			
17			
15			

DEVELOPMENT OF SPECIFICATIONS

A random selection of 50 flitches from the selected sample was used to develop a grading system to predict the yield of square and flat stock. Our primary goals for the system were accuracy and ease and speed of application. Of most systems tried, such as defect count, clear area, and number of cuttings, only one of the two objectives—speed or accuracy—could be achieved. The system selected predicts yield of squares or flat stock by reducing total possible yield (100 percent) by the percentage of defect determined by the number of "affected" compartments on the flitch. The compartments are areas that constitute either 1/9 or 1/16 of the total area of the flitch face.

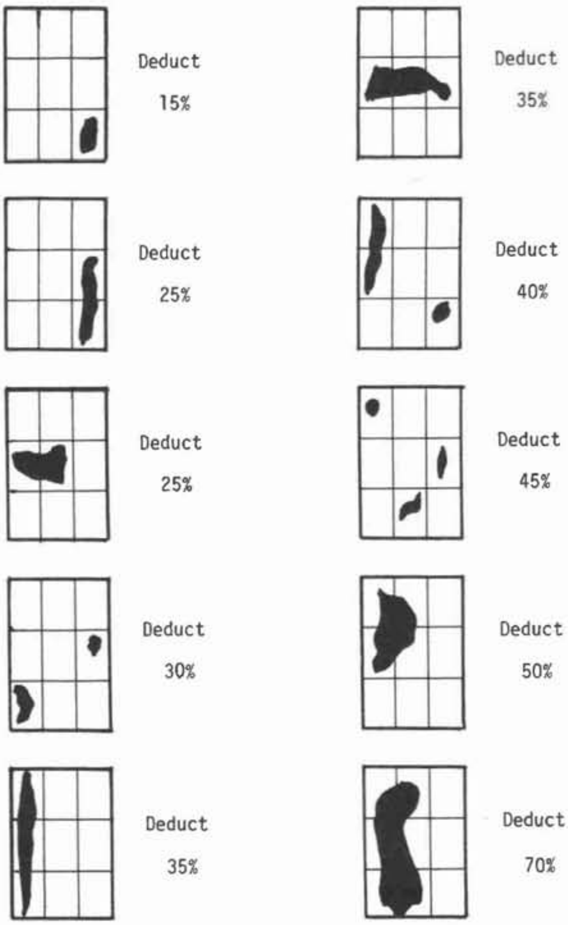
Figure 2.—Compartmentalization of defects by thirds (1/9 of area) or by quarters (1/16 of area).



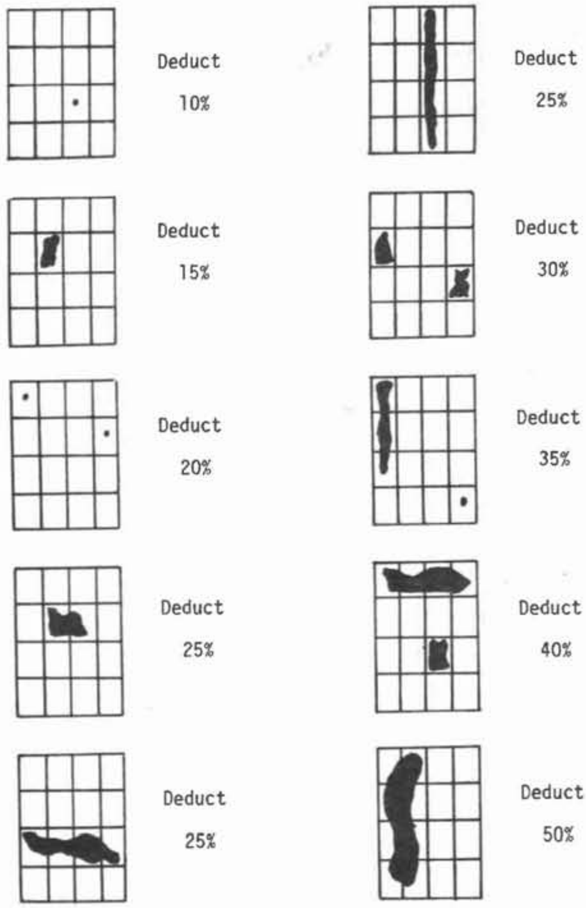
To select the best compartmentalization grid, simply visualize a grid divided in thirds or in quarters superimposed over the flitch, and select the one with the least number of affected compartments (Fig. 2). For flitches that are divided in thirds both lengthwise and horizontally (3 × 3) the minimum defect deduction is 15 percent. For those divided in quarters (4 × 4), the minimum deduction is 10 percent for small defects (pin knots, single grub hole, bark pocket, etc.; that is, defects small in relation to the size of the compartment in which it is contained) and 15 percent for other defects.

This system is easy to apply and can be done quickly. The following grids depict affected compartments and give the percentage that should be deducted accordingly:

1) For the 3 × 3 compartments:



2) For the 4 × 4 compartments:



3) Deductions for cutting and kerf:
If the defect deduction is 15 percent or less, deduct an additional 5 percent from total.

No deduction for cuttings and kerf is made if the total deduction is 20 percent or greater because our data show that the higher defect deduction rounded to an even 5 percent compensates for this additional reduction.

EVALUATION

As a test, the yield for each of the remaining flitches was estimated by this system and compared to the actual yield of cut up squares and flat stock. The results show that for the 8/4 flitches, 83 percent of the estimated yields were within ±5 percent of the actual yields, and for the 6/4 flitches, the figure was 81 percent.

We are not saying that this system is the only method or the best, but it does give a fast, fairly accurate estimate of yield of flitches to be cut up for furniture squares and random-width flat stock used at this study location. More data at other locations are needed to further test and refine this system, but we feel that plants that wish to segregate flitches by different levels of yield can use this technique in its present form or make modifications to fit their specific needs.

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