TABLES for estimating skidder TIRE WEAR

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TABLES
for estimating skidder
TIRE WEAR

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THIS BOOK OF TABLES was prepared to help the logging operator estimate how much a particular logging job will wear the tires on his rubber-wheeled skidders. This is an important element in the cost of a logging operation. The logging operator can translate these estimates of tire wear into a production cost.

The wheeled skidder—an articulated, four-wheel drive, rubber-tired, diesel-powered vehicle used to transport logs from the stump to the landing—has become almost standard equipment on logging jobs in the Northeast. The large rubber tires, some of which cost more than $800 each, take severe punishment in rough forest terrain.

Because the purchase and maintenance cost for tires is so great a part of the total production cost, the logger wants to know how much of the cost of logging can be attributed to tires. The measure of cost is how much his tires will wear during a logging operation.

The tables in this book were based on data from a tire-wear study made in Appalachia by the engineering staff of the USDA Forest Service's Forestry Sciences Laboratory at Morgantown, West Virginia.

HOW THE TABLES WERE PREPARED

The most important factor considered in this study was the amount of tread that is worn off in a known unit of operating time. (A new tire has approximately 1.5 inches of tread.) Seventy-six tires were measured periodically at an average of 60 working days between measurements, equivalent to 3 months' wear. The value for slope used in the tables was the average slope of all the logging operations, 28 percent. The data were collected in the Appalachian area, and will apply only to this area (fig. 1).

A small metal ruler and a vernier caliper with a depth gage were used to measure the depth of tread (fig. 2). The point of measurement was taken at the center of the tire between two lugs. When it was obvious that large chunks of tread had been torn away, this spot was not measured. Three measurements were taken, spaced as evenly as possible around the tire. The three measurements for each tire were averaged.

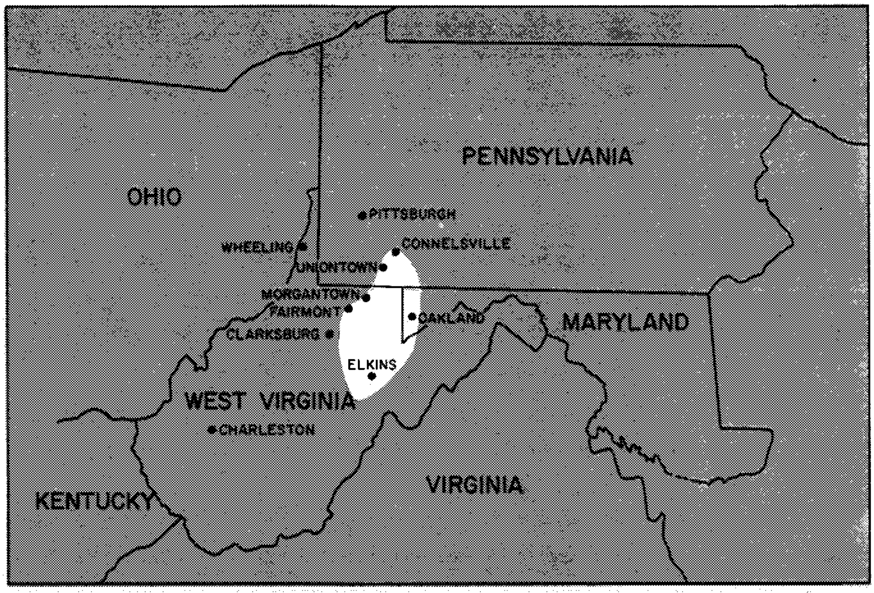

Figure 1.—The Appalachia area where the data were collected.

Figure 2.—The method used to measure depth of tread.

Factors considered in the study were: type and texture of soil, weight of skidder, horsepower of skidder, board feet skidded per day, degrees of skidroad rockiness, total hours worked, tire position (front or rear), slope of skidroad, number of tire repairs, tire brand, size, number of plies, and type of construction.

The type and texture of soil was constant in this study. The soil classification was a mixed soil in which sand was the predominant factor.

The rockiness of the skidroads was treated as follows. First, a representative 50-foot section of skidroad was chosen on each logging operation. The visible cross-section of each rock was measured and recorded. The skidroad was then classified according to rock size.

Two road classifications were used in this study: small rock and large rock. The small rock classification was applied to a representative section of skidroad that had rocks in visible cross-sections of less than 15 inches (fig. 3). The large rock classification was applied to a representative section of skidroad that had rocks in visible cross-sections larger than 15 inches (fig. 4).

Computer analyses were applied to the data. From these analyses four prediction equations were determined for each road class. We had an estimate of tire wear for each of the four tire locations; right front, left front, right rear, and left rear. From these estimates we chose the greatest wear on the two front tires and the greatest wear on the two rear tires.

The tables were prepared for several makes and sizes of skidders, and for the two classes of skidroad, making a total of 11 tables. The make of machine is mentioned for information only, and mention of the make should not be taken as an endorsement by the Forest Service or the Department of Agriculture.

Figure 3.—A skidroad classed as "small rock".

Figure 4.—A skidroad classed as "large rock".

HOW TO USE THE TABLES

- First decide which skidroad rockiness classification fits your logging area.
- Locate the table for the make and model of your skidder, and for your skidroad classification. These two items are shown at the top of the table.
- Locate in the table the general areas that fit your tire diameter and width.
- In column 1, locate the line for your production in thousand board feet.
- Read across this line to the right to find the inches of wear predicted for the front and rear tires.

Try an example. Your skidder is a John Deere 440, and the skidroad classification for your operation is large rocks. Find the table labeled for these (table 5).

Your tire diameter is 30 inches; tire width is 16.9 inches. Read down the table until you find the block of data for your tire diameter and your tire width. In column 1 you find a series of daily production rates. Locate your daily production rate. If your daily production rate is 14 thousand board feet, this is the line you want.

Read across this line to the right and you find the amount of tire wear, in inches, for the front and rear tires: for front tires 0.33 inch, for rear tires 0.24 inch.

This is how much wear you can expect on each wheel of your skidder for the logging operation you plan. This information is for working the machine for 60 days. From this you can estimate how much in tire wear this job is going to cost. Example: if an operation will take 120 working days to complete, your tire wear for those 120 working days will be approximately twice the 60-day value or 0.66 inches of wear on each front tire and 0.48 inches of wear on each rear tire.

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Table 1.

FRANKLIN 103 | SMALL ROCKS

(MACHINE DAYS: 60)

Daily production rate (1,000 board feet)	Predicted tire wear (in inches)	
	Front	Rear
DIAMETER 26.0 INCHES; WIDTH 16.9 INCHES		
4	0.0+	0.0+
6	.04	.0+
8	.08	.03
10	.12	.07
12	.15	.11
14	.19	.15
16	.24	.19
DIAMETER 26.0 INCHES; WIDTH 18.4 INCHES		
4	0.04	0.04
6	.08	.07
8	.12	.09
10	.16	.13
12	.20	.16
14	.25	.20
16	.30	.24

Table 2.

FRANKIN 130-B | SMALL ROCKS

(MACHINE DAYS: 60)

Daily production rate (1,000 board feet)	Predicted tire wear (in inches)	
	Front	Rear
DIAMETER 26.0 INCHES; WIDTH 18.4 INCHES		
4	0.0+	0.0+
6	.04	.03
8	.08	.07
10	.13	.11
12	.18	.14
14	.23	.18
16	.28	.22

Table 3.

FRANKLIN 160-B SMALL ROCKS

(MACHINE DAYS: 60)

Daily production rate (1,000 board feet)	Predicted tire wear (in inches)	
	Front	Rear
DIAMETER 26.0 INCHES; WIDTH 23.1 INCHES		
4	0.19	0.26
6	.24	.29
8	.29	.32
10	.34	.34
12	.40	.37
14	.45	.40
16	.50	.43

Table 4.

JOHN DEERE 440 SMALL ROCKS

(MACHINE DAYS: 60)

Daily production rate (1,000 board feet)	Predicted tire wear (in inches)	
	Front	Rear
DIAMETER 30.0 INCHES; WIDTH 16.9 INCHES		
4	0.0+	0.0+
6	.0+	.0+
8	.04	.02
10	.09	.05
12	.14	.09
14	.20	.13
16	.25	.17

Table 5.

JOHN DEERE 440 LARGE ROCKS

(MACHINE DAYS: 60)

Daily production rate (1,000 board feet)	Predicted tire wear (in inches)	
	Front	Rear
DIAMETER 26.0 INCHES; WIDTH 18.4 INCHES		
4	0.05	0.06
6	.08	.09
8	.14	.12
10	.19	.15
12	.24	.19
14	.29	.23
16	.34	.26
DIAMETER 30.0 INCHES; WIDTH 16.9 INCHES		
4	0.10	0.09
6	.14	.11
8	.18	.14
10	.22	.17
12	.28	.21
14	.33	.24
16	.38	.28

Table 6.

JOHN DEERE 440A SMALL ROCKS

(MACHINE DAYS: 60)

Daily production rate (1,000 board feet)	Predicted tire wear (in inches)	
	Front	Rear
DIAMETER 26.0 INCHES; WIDTH 18.4 INCHES		
4	0.0+	0.0+
6	.0+	.0+
8	.03	.02
10	.08	.06
12	.13	.10
14	.19	.14
16	.24	.18
DIAMETER 30.0 INCHES; WIDTH 16.9 INCHES		
4	0.0+	0.0+
6	.01	.01
8	.07	.04
10	.12	.08
12	.17	.12
14	.22	.16
16	.27	.19

Table 7.

PETTIBONE MASTER 8 — SMALL ROCKS

(MACHINE DAYS: 60)

Daily production rate (1,000 board feet)	Predicted tire wear (in inches)	
	Front	Rear
DIAMETER 26.0 INCHES; WIDTH 18.4 INCHES		
4	0.0+	0.0+
6	.01	.01
8	.05	.05
10	.11	.09
12	.16	.12
14	.21	.16
16	.26	.20

Table 8.

PETTIBONE MASTER 8 — LARGE ROCKS

(MACHINE DAYS: 60)

Daily production rate (1,000 board feet)	Predicted tire wear (in inches)	
	Front	Rear
DIAMETER 26.0 INCHES; WIDTH 18.4 INCHES		
4	0.15	0.16
6	.18	.19
8	.22	.22
10	.26	.24
12	.30	.27
14	.34	.30
16	.39	.33

Table 9.

TIMBERJACK 225 SMALL ROCKS

(MACHINE DAYS: 60)

Daily production rate (1,000 board feet)	Predicted tire wear (in inches)	
	Front	Rear
DIAMETER 26.0 INCHES; WIDTH 18.4 INCHES		
4	0.01	0.01
6	.05	.04
8	.09	.07
10	.13	.11
12	.18	.15
14	.24	.19
16	.29	.23
DIAMETER 30.0 INCHES; WIDTH 16.9 INCHES		
4	0.07	0.03
6	.11	.06
8	.14	.09
10	.18	.13
12	.22	.17
14	.27	.21
16	.32	.24

Table 10.

TIMBERJACK 225 LARGE ROCKS

(MACHINE DAYS: 60)

Daily production rate (1,000 board feet)	Predicted tire wear (in inches)	
	Front	Rear
DIAMETER 26.0 INCHES; WIDTH 18.4 INCHES		
4	0.20	0.21
6	.24	.24
8	.28	.27
10	.31	.30
12	.35	.33
14	.39	.35
16	.43	.38
DIAMETER 30.0 INCHES; WIDTH 16.9 INCHES		
4	0.25	0.24
6	.29	.27
8	.33	.30
10	.37	.32
12	.41	.35
14	.44	.38
16	.48	.41

Table 11.

C-7 TREE FARMER LARGE ROCKS

(MACHINE DAYS: 60)

Daily production rate (1,000 board feet)	Predicted tire wear (in inches)	
	Front	Rear
DIAMETER 30.0 INCHES; WIDTH 18.4 INCHES		
4	0.30	0.31
6	.34	.34
8	.38	.37
10	.41	.39
12	.45	.42
14	.49	.45
16	.53	.48

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