A SERVICE OF THE JUNEAU ECONOMIC DEVELOPMENT COUNCIL, WOOD PRODUCTS DEVELOPMENT SERVICE

ALASKA WOOD PRODUCTS BULLETIN

DANIEL PARRENT, EDITOR
204 SIGINAKA WAY, SITKA, AK 99835
TEL: 907.747.5688 FAX: 907.747.4331
E-MAIL: dparrent@ptialaska.net

SPRING/SUMMER 2003

In the last two issues of the Alaska Wood Products Bulletin, I went into considerable detail on the subject of Balanced Saw Performance. I discussed bite, feed rate, sawing time, saw sizing, gullet size, saw speed, kerf width and side clearance. In order to make it all work harmoniously however, you must provide enough power, which is what this issue of AWPB is all about.

All of this information can be found in *Circular Sawmills and Their Efficient Operation* by Stan Lunstrum, but the idea for the worksheet was Ken Kilborn's. I'll only take credit for pulling it all together in one place at one time.

CIRCULAR HEADRIG POWER REQUIREMENTS

STEP 1. DETERMINE MOST DESIRABLE SAW SIZE

From Lunstrum, page 12: *The diameter of the headsaw should be the smallest possible that can saw the largest logs expected. Using a saw larger than required increases difficulty in maintaining proper tension and adds to the number of teeth to keep in repair. On the other hand, time and money are often wasted in trying to cut logs larger than a saw can effectively handle. Slabs must be chopped free, often degrading potentially high-grade lumber. It is necessary to recognize the upper diameter limit that a saw can cut and make sure that logs above this limit are kept out of the mill. Table 1 shows the recommended saw diameters for the corresponding average largest logs that a saw can handle effectively. If a saw larger than 60 inches is needed, a top saw is recommended, rather than a larger headsaw.*

NOTE: In most situations, it is unrealistic to design a sawmill to handle 100% of the incoming material. Some material will just be too large and some will just be too small. A good rule of thumb is to design your mill to handle 95% of the incoming raw material. Sell the other 5% to another mill that can handle it more efficiently.

Table 1. Recommended saw diameters for corresponding average largest logs.

Diameter of average largest logs (inches)	Saw diameter (inches)
18	40
20	44
22	48
26	52
30	56
34	60

STEP 2. DETERMINE RECOMMENDED TOOTH STYLE

From Lunstrum, pages 14-15: *A tooth must cut through a given thickness of wood before the gullet becomes filled. Wood, as sawdust in the gullet, occupies approximately 43 percent more space than it does as solid wood. Since the gullet capacities of various tooth styles vary considerably, it is important to use the proper style for the size of logs to be sawn. Inefficient headsaw operation results if tooth style is not selected according to the average largest logs sawn. For example, using a 2-1/2 style tooth on a 22-inch diameter log will not allow a carriage speed that results in the production of coarse sawdust. Using a D style tooth on 12-inch diameter logs restricts carriage speed because the saw contains fewer teeth. See the following table for recommended tooth styles for various types and sizes of logs.*

Table 2. Recommended tooth styles[1] for circular headsaws for various types and sizes of logs

Type of logs	**Diameter range of logs (inches)**		
	10-19	**13-21**	**20-33**
Knotty	F, 2-1/2	B	
Frozen	F, 2-1/2	B, 3-1/2	D, 4-1/2
Hard hardwoods; hard softwoods	F	B	D
Soft hardwoods; softwoods	2-1/2	3, 3-1/2	4-1/2

[1] Bits in F, B and D tooth styles are interchangeable, but shanks are not.

STEP 3. DETERMINE RECOMMENDED SAW GAGE

From Lunstrum, page 12: *Saw gage should be selected according to the load the saw will encounter under severe conditions. Large logs, hard logs, fast saw speeds and a fast carriage speed all demand, in general, a heavier gage saw to withstand the increased stress. The table below shows the recommended saw gages for various tooth and shank styles, saw diameters, and load conditions.*

Table 3. Recommended saw gages for various tooth styles, saw sizes and load demands.

Tooth Style	**Saw Diameter**					
	40" to 54"			**56" to 62"**		
	Light load	**Medium load**	**Heavy load**	**Light load**	**Medium load**	**Heavy load**
	- - - - - - - - - - - - - - - saw gages - - - - - - - - - - - - - - -					
2-1/2, F	9/10	8/9	7/8	8/9	7/8	
B, 3	8/9	7/8	6/7	7/8	6/7	6/7
3-1/2		7/8	5/6	7/8	6/7	5/6
D, 4-1/2		6/7	5/6	6/7	5/6	5/6

STEP 4. DETERMINE MAXIMUM NUMBER OF TEETH

From Lunstrum, page 16: *At a given rim speed, a saw with the maximum number of teeth can do more work per unit of time than one with fewer teeth. But keep in mind that horsepower requirements increase with an increase in the number of saw teeth. If available power at the headsaw is insufficient for the saw to maintain the proper bite, either a saw with fewer teeth should be used or the power should be increased. The table below shows the maximum number of inserted teeth for standard saws of given diameter.*

Table 4. Maximum number of inserted teeth in standard headsaws.

Tooth Style	Saw diameter (inches)									
	40	42	44	45	48	50	52	54	56	60
	- - - - - - - - - - - - - - - number of teeth - - - - - - - - - - - - - - -									
2-1/2	44	46	48	50	54	56				
F			42	44	46	48	50	52	54	
B			34	38	42	42	44	44	48	
3			40	42	46	48	50	50	50	
3-1/2			38	40	42	44	46	48	50	52
D					36	36	36	40	40	44
4-1/2					38	40	40	44	44	44

STEP 5. DETERMINE RECOMMENDED CUTTING EDGE WIDTHS OF SAW TEETH

From Lunstrum, page 16: *The cutting edge of saw teeth must provide a path (saw kerf) wide enough for the saw plate to clear without making excessive contact with the wood. If excessive contact is made during the cut, resulting friction usually causes the saw plate to heat and expand. This, of course, leads to sawing problems and makes it impossible to saw accurate lumber. In general, softwoods require a wider saw kerf than hardwoods because softwoods tend to be more "fuzzy grained". Softwoods in general do not cut as cleanly and smoothly as most hardwoods.*

A narrower cutting edge can be used in sawing frozen wood because all frozen wood generally cuts more cleanly than unfrozen wood. A narrow cutting edge also demands less power, which is especially important in sawing frozen logs because freezing increases power demand in general. A slowdown in carriage speed is often forced while sawing frozen logs, especially if the cutting edge is wider than necessary. A wider cutting edge is normally required when using tooth styles with larger gullet capacity and when encountering heavy load demands such as when feeding heavy or sawing large logs. The increased stresses must be absorbed by a heavier gage saw and teeth.

NOTE: An excessively wide saw kerf (cutting edge width) combined with a slow feed rate will allow sawdust to spill out of the gullet, which usually results in heating due to friction between the saw plate, sawdust and log.

Table 5. Recommended cutting edge widths of saw teeth affected by saw gage, tooth style, and type of logs

Tooth Style	Saw Gage				
	9/10	8/9	7/8	6/7	5/6
	Unfrozen softwood				
2-1/2, F	17/64"	18/64"	20/64"		
B, 3		18/64"	20/64"	22/64"	
3-1/2			20/64"	22/64"	24/64"
D, 4-1/2				24/64"	26/64"
	Unfrozen hardwood				
2-1/2, F	16/64	17/64	18/64		
B, 3		17/64	18/64	20/64	
3-1/2			18/64	20/64	22/64
D, 4-1/2				22/64	24/64
	Frozen softwood or frozen hardwood				
2-1/2, F	14/64 - 16/64	16/64	17/64		
B, 3		16/64	17/64	18/64	
3-1/2			17/64	18/64	20/64
D, 4-1/2				20/64	22/64

STEP 6. DETERMINE THE HARDNESS GROUP OF THE WOOD YOU SAW

From Lunstrum, page 30: *The hardness of the wood has a direct effect on horsepower requirements. This effect is incorporated into the horsepower table by using four hardness groups. All commercial sawtimber sawn in the United States falls into one of these groups, depending on specific gravity, as follows:*

Table 6. Hardness groupings by specific gravity and Alaska species

Hardness group	Specific gravity	Alaska species (specific gravity)
1	0.35 and less	western red cedar (0.31), aspen (0.35), black cottonwood (0.32)
2	0.36 - 0.45	Alaska yellow cedar (0.42), western hemlock (0.38), mountain hemlock (0.43), black spruce (0.38), Sitka spruce (0.37), white spruce (0.37), red alder (0.37),
3	0.46 - 0.55	Alaska white birch (0.49), tamarack (0.49)
4	0.56 and above	no Alaska species

STEP 7. DETERMINE SAW FEED (INCHES PER REVOLUTION)

From Lunstrum, pages 30-31: *Saw feed is the distance the log or cant advances into the saw per single revolution of the saw and can often be measured directly on a board or cant* by measuring the distance between distinctive tooth marks. *The saw feed value can be calculated by multiplying the desired bite* [per tooth] *times the number of teeth in the saw. Saw feed values in the following table are based on taking an average bite per tooth (0.11 inches) and are rounded off to the nearest 1/2-inch.*

Table 7. Saw feed values

Number of teeth in saw	Saw feed value (inches per revolution)
36 - 38	4.0
40 - 42	4.5
44 - 46	5.0
48 - 50 - 52	5.5
54 - 56	6.0
58 - 60	6.5

STEP 8. DETERMINE APPROPRIATE SAW SPEED

From Lunstrum, page 29: *In general, for good saw performance, a rim speed of 8,000 to 9,000 feet per minute (fpm) is recommended for sawing hardwoods; 10,000 to 11,000 fpm for softwoods; and 6,000 to 7,000 for frozen woods. The relationship of saw diameter and saw speed necessary to attain a predetermined rim speed is given in Table 8 (page 5).*

STEP 9. DETERMINE HORSEPOWER REQUIRED AT THE HEADSAW

The required horsepower is based on a combination of factors: hardness group of the species being sawn, sawblade tooth style, the maximum cant face width, and saw feed. These factors are combined in the Table 9A (page 5). The basic horsepower values shown are for headsaws turning at a speed of 550 rpm. Horsepower requirements for saw speeds other than 550 rpm are arrived at by multiplying the basic horsepower values in the table by a correction factor for the desired speed as given in the footnote to Table 9A and in Table 9B (page 6).

Table 8. Headsaw rim speed as a function of saw diameter and rpm.

Saw diameter (inches)	Rim speed of saw (feet per minute)					
	6,000	7,000	8,000	9,000	10,000	11,000
	- - - - - revolutions per minute (rpm) - - - - -					
40	573	668	764	859	955	1050
42	546	637	728	819	909	1000
44	521	608	694	781	868	955
46	498	581	664	747	830	913
48	477	557	637	716	796	875
50	458	535	611	688	764	840
52	441	514	588	661	735	808
54	424	495	566	637	707	778
56	409	477	546	614	682	750
58	395	461	527	593	659	724
60	382	446	509	573	637	700

Table 9A. Basic horsepower required at the headsaw as a function of species hardness, tooth style and feed rate

Hardness Group	Tooth style	Maximum cant face width (in.)	Saw feed, inches per revolution					
			4.0	4.5	5.0	5.5	6.0	6.5
			- - - - - horsepower required - - - - -					
1	2-1/2	12			66	72	80	86
	F	16		80	88	95	107	114
	B, 3	19	91	100	110	119	134	
	3-1/2	22	109	120	132	143		
	D, 4-1/2	28	145	160	176			
2	2-1/2	12			78	85	95	102
	F	16		95	104	113	127	136
	B, 3	19	108	119	130	141	158	
	3-1/2	22	129	143	156	170		
	D, 4-1/2	28	172	190	208			
3	2-1/2	12			97	105	118	126
	F	16		118	129	140	157	168
	B, 3	19	133	147	161	175	196	
	3-1/2	22	160	176	193	210		
	D, 4-1/2	28	213	235	257			
4	2-1/2	12			117	127	142	152
	F	16		142	156	169	189	203
	B, 3	19	161	178	195	211	237	
	3-1/2	22	193	231	233	254		
	D, 4-1/2	28	257	284	311			

NOTE: Basic horsepower values in this table are based on the following constants: standard bite (0.11 inch); maximum cant face for tooth style; saw kerf of 9/32 inch; and saw speed of 550 rpm. For each 1/32-inch increase or decrease in kerf width, adjust basic horsepower values by 11 percent. For a saw speed other than 550 rpm, multiply basic horsepower values times the appropriate correction factors as follows:

Table 9B. Correction factors for basic headsaw horsepower requirements as a function of rpm

Saw speed (rpm)	Correction factor
400	0.75
450	0.82
500	0.91
550	1.00
600	1.09
650	1.18
700	1.28
750	1.37
800	1.46
850	1.55
900	1.64
950	1.73
1000	1.82
1050	1.91
1100	2.00

STEP 10. DETERMINE PULLEY AND V-BELT ARRANGEMENTS (STEPS 10A-10F)

From Lunstrum, pages 20-21: *To insure full use of available power to the headsaw, an effective means of transmission must be provided. Factors to consider in a V-belt system are: (1) belt size, (2) pulley sizes, and (3) number of belts. Also, to insure best performance, the belt transmission system should be designed so that belt speed does not exceed the limits set by the manufacturer. This is normally about 5,000 to 6,000 feet per minute (fpm). Belt speed can be calculated by using the following formula:*

Belt speed in feet per minute = 0.262 x (pitch diameter of pulley in inches) x (rpm of shaft)

Pitch diameter is measured from about 2/3 the height of the groove (fig A).

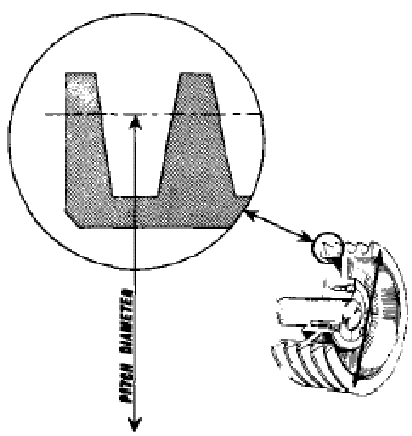

Figure A. Pitch diameter is measured from about two-thirds the height of the groove.

10A. BELT SIZE

From Lunstrum, page 21: *Most V-belt manufacturers have standardized their belt sizes according to the cross-sectional area of the belt and have given them the letter designations A, B, C, D, and E. The most common belts used in sawmill power transmission systems are sizes B, C, and D. Table 10A shows the recommended belt sizes for various combinations of horsepower and drive shaft speed.*

Table 10A. Recommended V-belt sizes as a function of horsepower and shaft speed

Design horsepower[1]	Drive shaft speed (rpm)							
	600	**700**	**800**	**900-1100**	**1200**	**1300-2000**	**2100**	**2200-3400**
75	D	D	D	D/C	C	C	C/B	B
100	D	D	D	D	D/C	C	C/B	B
125	D	D	D	D	D/C	C	C/B	B
150	E	D/E	D	D	D/C	C	C/B	B
175 and up	E	E	D/E	D	D/C	C	C/B	B

[1] Design horsepower is computed by multiplying maximum horsepower ratings by 1.3

10B. Speed Ratio

From Lunstrum, pages 22-23: "*Speed ratio" is handy to know while making computations concerning belt and pulley hookups. Figure speed ratio by either*

(1) Dividing the speed of the driver pulley by the speed of the driven pulley, or
(2) Dividing the diameter of the driven pulley by the diameter of the driver pulley.

For example: Determine the speed ratio where the speed of the driver pulley is 1,800 rpm and the speed of the driven pulley is 550 rpm. Dividing 1,800 by 550 gives a speed ratio of 3.27. If you had decided that the driver pulley diameter should be 13 inches, simply multiply 13 times 3.27 for a driven pulley diameter of 42.51 inches to get the desired 550 rpm on the saw. If you knew the diameter of the driven pulley and wanted to know what diameter the drive pulley should be, then divide by the speed ratio. Check these calculations for correctness by multiplying the diameter times the speed for each pulley for a given hookup; the results will be equal (or nearly so) if the figures are correct.

10C. Pulley Sizes

From Lunstrum, page 22: *Correct pulley diameter is determined primarily from the kind of power, belt size and pulley speeds used. Since these factors interact, they should be considered collectively when determining pulley sizes. Within reasonable limits, using the largest pulley possible on the power source permits using the fewest number of belts. This is because the contact area of the belts on a larger pulley hookup is greater than on a smaller pulley hookup, even though the arc of contact may be the same in each case. For best performance, the size of the pulleys should fall within a certain range according to the belt size used. Table 10C1 shows the recommended pitch diameter ranges of the drive pulley for given belt sizes:*

Table 10C1. Recommended pitch diameter ranges of drive pulley as a function of belt size

Belt Size	Pitch Diameter ranges of drive pulley (inches)
B	4.6 - 9.4
C	7.0 - 16.0
D	12.0 - 24.0
E	18.0 - 36.0

Table 10C2 shows the recommended minimum pulley diameters at specified horsepower and shaft speeds when electric motors are used as power sources. While these figures are generally conservative, a specific motor and bearing combination may allow using a smaller motor pulley. When other than a standard hookup is desired, be sure to check with the motor manufacturer.

Table 10C2. Recommended minimum pulley diameters for electric motors at specified horsepower and shaft speeds

Motor horsepower	Motor speed, rpm				
	575	695	870	1160	1750
	- - - - - inches - - - - -				
75	14	13	10	10	9
100	18	15	13	13	10
125	20	18	15	13	11
150	22	20	18	13	
200	22	22	22		
250	22	22			
300	27	27			

10D. V-BELT HORSEPOWER RATINGS

Table 10D shows basic horsepower ratings per belt for combinations of belt sizes, pulley diameters and pulley speeds. Correction factors for belt length and arc of contact must be applied when using this table.

Table 10D. Horsepower ratings per belt [1]

RPM of driver shaft	B BELTS				
	- - - - - pitch diameter, driver pulley (inches) - - - - -				
	5	6	7	8	9
1800	5.13	6.90	8.55	10.07	11.46
2200	5.85	7.83	9.61	11.13	12.53
2600	6.32	8.53	10.33	11.80	12.80
3000	6.83	8.96	10.64	11.77	
3400	7.06	9.10	10.50		
RPM of driver shaft	C BELTS				
	- - - - - pitch diameter, driver pulley (inches) - - - - -				
	7	9	11	13	16
600	5.00	7.56	10.04	12.41	15.81
1000	7.40	11.28	14.98	18.28	22.88
1400	9.34	14.25	18.55	22.25	26.45
1800	10.79	16.23	20.63	23.73	
2200	11.68	17.20	20.80		
RPM of driver shaft	D BELTS				
	- - - - - pitch diameter, driver pulley (inches) - - - - -				
	12	14	16	18	20
600	16.81	21.81	26.71	31.31	35.81
800	20.55	26.75	32.55	38.05	43.05
1000	23.59	30.59	36.99	42.69	47.69
1200	25.83	33.23	39.63	44.93	49.03
1400	27.17	34.47	40.37		
RPM of driver shaft	E BELTS				
	Pitch diameter, driver pulley (inches)				
	18	20	22	24	26
600	37.7	44.2	50.5	56.5	62.1
700	41.6	48.7	55.3	61.5	67.2
800	44.8	52.2	59.0	65.1	70.5
900	47.3	54.8	61.4	67.1	71.8
1000	48.91	56.31	62.41	67.31	

[1] Horsepower ratings include additional horsepower per belt for speed ratios of 2.00 and above, which are generally used in sawmill headsaw hookups

10E. APPLY CORRECTION FACTORS

(1) Belt Length

From Lunstrum, page 24: In determining the belt length correction factor, the distance between the pulley centers must be known. The recommended center distance, C, should be equal to either D, the pitch diameter of the larger pulley, ***OR*** *(D+3d)/2, in which case "d" is the pitch diameter of the smaller pulley. Apply whichever value is larger. The center distance, C, is then used in the following formula to find belt length:*

$$\text{Belt length} = (1.57 \times (D+d)) + 2C$$

Belt length is then used in the following table to find the appropriate correction factor to apply to the basic horsepower rating determined in Table 10D.

Table 10E1. Correction factors for various belt lengths to be applied to horsepower ratings:

Belt length (inches)	Belt Size			
	B	C	D	E
100	1.02	0.92		
120	1.07	0.96	0.86	
140	1.10	0.99	0.89	
160	1.13	1.02	0.92	
180	1.16	1.05	0.94	0.91
200	1.18	1.07	0.96	0.92
220	1.20	1.09	0.98	0.94
240	1.22	1.11	1.00	0.96
260	1.24	1.13	1.02	0.98
280	1.26	1.15	1.04	1.00
300	1.27	1.16	1.05	1.01
320		1.18	1.06	1.02

(2) Arc of Contact

From Lunstrum, pages 24-25: *Usually the driver pulley (d) is smaller in diameter than the driven pulley (D) in the power-source-headsaw hookup. On the smaller pulley, surface contact between the belt and pulley is reduced, which limits the power transmission capability. The arc of contact must be considered when determining the horsepower ratings per belt. It can be found by using the following formula:*

$$\text{Arc of contact} = 180^{O} - [\{(D-d) \times 60\} \div C]$$

The arc of contact value is then used in the following table (Table 10E2) to find the appropriate correction factor, which is then applied to the basic horsepower rating determined in Table 10D.

Table 10E2. Correction factors for various arc-of-contact values

Arc of Contact (degrees)	Correction Factor
100	0.73
110	0.79
120	0.82
130	0.86
140	0.89
150	0.92
160	0.95
170	0.98

10F. REQUIRED NUMBER OF BELTS

From Lunstrum, page 24: *The number of belts is determined by the amount of horsepower that each belt is capable of transmitting to the saw in a given hookup. The transmission capability is determined from the belt size, pulley diameters, pulley speeds, belt length and arc of contact.* Divide the necessary horsepower (9A,B) by the adjusted horsepower rating per belt (10D, E1, E2).

NOTE: V-belts should be installed as matched sets and all belts must be equally tensioned.

Circular Headrig Power Requirements Worksheet

Step	Parameter	Example	Answer
1	Determine optimum saw size based on diameter of average largest log	If average largest log is 24 inches, the optimum saw size is 50 inches (Table 1)	50
2	Determine recommended tooth style, based on size and type of logs	Using the value for softwoods, 13-21 inches in diameter, the choices are "3" and "3-1/2". I would choose the 3-1/2 because it is also recommended for frozen wood. (Table 2)	3-1/2
3	Determine recommended saw gage, based on tooth style, saw size and load demands	For a 50-inch saw with 3-1/2 style teeth under medium load demand, the recommended saw gage is 7/8. (Table 3)	7/8
4	Determine maximum number of teeth, based on tooth style and saw diameter	For a 50-inch saw with 3-1/2 style teeth, the maximum number of teeth would be 44. (Table 4)	44
5	Determine the recommended cutting edge width of saw teeth	When sawing unfrozen softwoods with a 7/8 gage saw outfitted with style 3-1/2 teeth, the recommended cutting edge width is 20/64 inches or 5/16. NOTE: In frozen wood that kerf width could be reduced to 17/64 inches. (Table 5)	20/64
6	Determine the hardness group of the wood you saw	In this example, use hardness group 2, which includes Alaskan hemlocks, spruces, yellow cedar and alder. (Table 6)	2
7	Determine saw feed (inches per revolution)	Mathematically, 44 x .11 = 4.84. From Table 7, the answer is 5.0	5.0
8	Determine appropriate saw speed	A saw rim speed of 10-11,000 is recommended for sawing softwoods. A 50-inch saw would have to be turning at 764-840 rpm to attain such rim speeds. For this example, use 800 rpm. Note: for frozen wood, a saw speed of 6-7,000 fpm is recommended. To achieve those speeds with a 50-inch saw, the saw would have to turn at 458-535 rpm. (Table 8)	800 rpm
9A	Determine horsepower required at the headsaw	The required horsepower is based on a combination of factors: hardness group of the species being sawn, sawblade tooth style, and saw feed. In this example, we're using hardness group 2, tooth style 3-1/2, and a saw feed of 5 inches per revolution. Therefore the necessary horsepower is 156 hp. (Table 9A)	156
9B	Apply correction factors	The values in Table 9A are based on 1. a standard kerf width of 9/32 (18/64). For each 1/32 (2/64) inches over 9/32, the horsepower requirement must be increased by 11 percent. So, 156 plus 11% of 156 = 173. (Table 9A footnote) 2. a standard saw speed of 550 rpm. Given our saw speed of 800 rpm, we must apply a correction factor of 1.46. So, 173 x 1.46 = 253. (Table 9B).	253

10A	Determine appropriate belt size.	Given a design horsepower of over 175 and a shaft speed of 800 rpm, the recommended belt size is D or E. We'll use D (Table 10A)	D
10B	Determine speed ratio	To determine the speed ratio, you must know the speed of the motor and the desired speed of the saw arbor OR the diameter of the driver pulley and the diameter of the driven pulley. Let's say our motor turns at 1160 rpm and our target saw arbor speed is 800 rpm. The speed ratio would be 1160/800 = 1.45, which means the driven pulley would be 1.45 times larger than the driver pulley.	1.45
10C	Determine appropriate pulley sizes	1. Table 10C1 recommends a drive pulley pitch diameter of 12.0-24.0 inches for D size belts. 2. Table 10C2 recommends minimum pulley sizes for given horsepower motors and motor speeds. This table does not indicate a minimum pulley diameter for the example proposed, but an 18 or 20-inch minimum would not be an unreasonable estimate. Remember, this is a minimum.	Here are some solutions based on the speed ratio of 1.45: Driver / Driven 12 / 17.4 14 / 20.3 16 / 23.2 18 / 26.1 20 / 29.0 22 / 31.9 24 / 34.8
10D	Determine the horsepower rating per belt	From Table 10D, find the appropriate belt size (D), rpm of the motor (1200) and pitch diameter of the driver pulley (let's use 18). The answer is 44.93	44.93
10E1	Determine belt length correction factor Belt length = (1.57 x (D+d)) + 2C	Belt length is a function of pulley diameters (D and d) and distance between pulley centers (C). It is recommended that C equal D or ((D+3d/2), whichever is greater. In the real world, it is what it is. Let's use 46". Using C=46, D=226 and d=18, belt length, according to the formula, is equal to 161 inches. The correction factor for a D belt 160 inches in length is 0.92. (Table 10E1)	0.92
	Apply belt length correction factor to belt horsepower rating	44.93 x 0.92 = 41.34	41.34
10E2	Determine arc of contact correction factor Arc of contact = 180^O - (((D-d) x 60) ÷ C)	Using the formula, we would get 180-[{(26-18)x60} ÷ 46] 180-[{8x60} ÷ 46] 180-[480 ÷ 46] 180-[10.43] = 169.56 The correction factor, from Table 10E2 would be 0.98	0.98
	Apply arc of contact correction factor to adjuster belt horsepower rating	41.34 x 0.98 = 40.5	40.5
10F	Determine the number of belts required	Divide the necessary horsepower (Item 9B) by the adjusted horsepower rating per belt. In this example, 253 ÷ 40.5 = 6.25 (or 6)	6

Get Set For AWFS

The Association of Woodworking and Furnishing Suppliers (AWFS) is sponsoring the largest wood products and woodworking machinery tradeshow in North America in Anaheim, CA from July 31 through August 3, 2003. The show typically draws more than 30,000 attendees, over 800 exhibitors and occupies 400,000 square feet of exhibit space. In addition to the show itself, there will be a variety of workshops, demonstrations and seminars on various techniques, new technologies, products and materials, designs, business, and safety and environment available. For more details go to www.AWFSFair.org or call (323) 726-8157 or fax (323) 622-0321.

Through the cooperative efforts of the Juneau Economic Development Council, UAS Sitka Forest Products Program, USDAFS Alaska Wood Utilization Center and the Alaska Department of Commerce and Economic Development, Alaska interests and wood products will be represented at this show. We have reserved a 10'x20' booth in Hall D. We plan on displaying samples of Alaskan woods and Alaskan wood products. We also plan to gather marketing leads and conduct market research. You are invited to participate.

For more information in participating in this groundbreaking effort for Alaska manufacturers contact any of the Alaska AWFS Tradeshow committee members:

Al Brackley	University of Alaska Southeast (Sitka)	747-7752
Dave Nicholls	Alaska Wood Utilization Center	747-4311
Joe Roos	Alaska Wood Utilization Center	747-4312
Dan Parrent	Juneau Economic Development Council	747-5688

JEDC/Wood Products Development Service
204 Siginaka Way
Sitka, AK 99835

FIRST CLASS MAIL
RETURN SERVICE REQUESTED