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

ALASKA WOOD PRODUCTS BULLETIN

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BALANCED SAW PERFORMANCE -- PART 2

In the Spring 2001 issue of this bulletin, I discussed bite, feed rate and sawing time. I am continuing here with a discussion of saw sizing, gullet size, cutting edge width and side clearance, and saw speed. Much of the information was obtained from publications by Stan Lunstrum, of the USDAFS Forest Products Laboratory, P.S. Quelch of Armstrong Manufacturing Co. and Jim Peek of the Lake Erie and Ontario Sawyers and Filers Association.

The saw is one of the least understood and most abused pieces of equipment in the sawmill. It's run too fast; it's run too slow; it's overheated; it's overstressed; it's overfed or underfed; it's under-powered (usually) or, in rare cases, overpowered. Add to that widely varying densities of the wood, incorrect or inadequate sharpening, misalignment, wide variations in ambient temperature and you can begin to see all the combinations of problems in any given setup.

Often, sawmillers operate their saws with less than adequate knowledge about correct bite, feed speeds, tooth speeds, side clearances, depths of cut and power requirements. However, every saw is limited to a rather narrow operating range. Experience has taught most sawmillers which saws to use for specific applications. But for optimal saw selection, it is possible to calculate the variables involved. Using the correct saw for the job at hand will maximize production, reduce operating problems, maximize saw life and increase recovery efficiency by reducing sawing variation and producing more accurately sized lumber.

Saw Sizing

The diameter of a circular saw should be the smallest possible that can handle the cant or log size to be sawn. Using a larger saw than necessary increases maintenance time and costs, and is likely to reduce lumber quality. For maximum efficiency, the saw diameter should be commensurate with the task.

The diameter of a circular saw physically limits the depth-of-cut it can handle effectively. While it is technically possible to saw to a depth-of-cut equal to the radius of the saw minus the radius of the collar, it is not normal practice (Note: smaller saws can accommodate this practice more easily than larger saws). As a general rule of thumb, a circular saw should saw a depth-of-cut no greater than (approximately) two-thirds of the saw radius.

The *effective depth-of-cut* is not synonymous with the maximum log diameter a saw can handle. When breaking down a log, the sawyer does not normally saw the log down the middle on the beginning cut. Rather, logs are slabbed, a few boards are sawn and then the log is turned to a new face. Thus a log is reduced to a size where it can be sawn without further turning.

For band saws, determining correct wheel diameter for a given task is more difficult than for circular saws. The saw gauge, blade width, tooth pitch and height, and the gullet size must be considered when making this decision.

Once depth-of-cut is established, it should be strictly adhered to. If the depth of cut is exceeded, gullets become overloaded with sawdust, or the sawdust becomes excessively fine and leaks out of the gullet, which pushes the saw off line, causing variation in the lumber. Once depth-of-cut for an operation is established, the smallest wheel or saw blade diameter should then be used.

Gullet Size

One of the main functions of the gullet is to chamber and remove sawdust particles from the saw cut. Anything that hinders the gullet from performing this task should be avoided. "Hindering actions" include feeding too fast, feeding too slow, cutting too deep, turning the saw too fast or under-powering the saw. The results include excessive amounts of sawdust, excessively fine sawdust particles or sawdust particles that are so big they clog the gullets, possibly stalling the saw in the cut.

How much sawdust can a gullet hold? That's the $64,000 question, and one that has never been completely answered. In the 1950s, a number of researchers studied sawdust spillage and even devised ways of photographing it. A Swedish researcher named Thunnel attached Plexiglas disks to each side of a saw, so they would rotate with the saw. Then he fed stock, which was the same width as the teeth, into the saw and used high-speed photography to record the results. His photographs of a deep cut showed that, when the saw was cutting with the grain, a long ribbon of wood was made, which followed the shape of the gullet but, as the tooth swung downward across end grain, much smaller particles were made. The contents of the relatively round gullet swirled, breaking the long ribbons into smaller particles.

To attempt an answer to the original question is dependent on many factors such as wood density, moisture content, percent of the gullet that can be effectively utilized and the amount of sawdust spillage incurred. Freshly cut sawdust occupies from 3 to 6 times more space in the free state -- that is, before any compaction occurs. Green, soft, low-density wood in sawdust form expands the least, while dry hard high-density wood expands the most.

Sawdust packs in the gullet cavity because of the pressure that is exerted from sawdust particles traveling at high velocity slamming into the sawdust that has already come to rest in the gullet. The fuller the gullet becomes, the greater the pressure. Laboratory tests have shown that pressure in the gullet can build up to 2,000 pounds per square inch in the compaction process. However, conditions that would allow a buildup of 2,000 psi in the gullet are probably rare in normal sawing. Experts generally agree that sawdust will normally pack in the gullets to about 50 percent of its volume in the free state for bandsaws and larger circular saws. If this is true, then gullet size needs to be from 1 1/2 to 3 times the volume of the solid wood from which the sawdust is generated.

How big are your gullets? One of the best methods that can be used to determine gullet cross-sectional area is to trace the gullet outline on a sheet of graph paper. The preferred size (of graph paper) is 10 lines to the inch, or 100 squares per square inch. After the gullet outline has been traced carefully, simply count the number of squares within the gullet boundary (for partial squares, count every other one). Divide the total number of squares by 100 and you have the gullet cross-section in square inches. Table 1 presents common tooth style designations and their gullet areas (in square inches):

Table 1

Tooth Style	Gullet Area (square inches)
2 1/2	1.5
F	2.0
3 and B	2.5
3 1/2	3.0
D and 4 1/2	4.0

Most sawmill experts agree that, for good saw performance, sawdust should be chambered in the gullet cavity and carried along and discharged as the tooth emerges from the cut. Overloading the gullet results in sawdust spillage along the side of the saw, while the saw is still in the cut. As sawdust spills out and is squeezed between the saw blade and the wood, it causes friction, which causes heating, and drag on the saw. In severe cases, overloading the gullets can actually stop a saw in the cut. Sawdust spillage usually occurs unevenly, thus forcing the saw off line, causing variation in lumber thickness. In addition, power demand significantly increases at the point of overloading.

Any tooth style can be made to work in most any sawing application. *Efficient* saw operation, however, requires using a tooth style that has been carefully selected for a specific job. For sawing large logs, a tooth style with a large gullet capacity is recommended. Such large gullet capacity allows the carriage to be fed at the speed required for the saw teeth to maintain the proper bite, provided the power is adequate. Using large gullet capacity on large logs also results in efficient power utilization. However, excessive gullet capacity is as equally undesirable as insufficient gullet capacity. When sawing smaller logs, where large gullet capacity is not required, allows using more saw teeth for

maximum feed speed, productivity and smoothest board surface. Having a greater number of teeth also helps prevent the saw from dodging in the cut, especially in knotty logs. Be cautioned however, that over-biting on narrower depths-of-cut can damage the tooth assembly as well as the saw. On shallow depths-of-cut, the tendency is to overfeed because power is usually more than adequate. But, overfeeding often results in tearing the wood, particularly around larger knots, making a rough board surface.

Saw Speed

Have you ever seen a highway speed limit posted in RPM (revolutions per minute)? Of course not; that would be silly. It doesn't take a genius to figure that out when a truck and a compact car have wheels of different sizes turning at the same RPM, the truck's larger wheels are going to make it go faster than the compact car (at equal RPMs).

Likewise, if we want to know the speed of a saw, it makes more sense to talk about how fast the teeth (that do the work) are going -- which is known as rim speed or saw speed or tooth speed -- rather than to talk about how fast the shaft is turning. Why? Because how a tooth cuts, how the sawdust breaks up and whether it heats the saw in the process has a lot to do with the saw's rim speed.

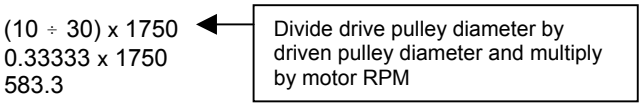
When the tooth cuts through the log, a curl of wood is formed that breaks up in the gullet. If the curl breaks into coarse pieces, it remains trapped in the gullet until the gullet is out of the cut (this is what is supposed to happen). Faster saw speeds (and under-feeding) results in the sawdust being broken up into small particles or powder that can leak out of the gullet while the saw is still in the cut, which will cause heating of the saw (usually in the rim area).

If you want to know what your saw's rim speed is, you must know two things: the diameter of the saw and the saw's RPM. It's easy enough to measure the diameter of the saw, but measuring RPM is a bit more difficult. It's surprising how few mills actually know what their RPM is, and being off by as little as 50 revolutions per minute is enough for any saw doctor to tension the saw incorrectly.

Probably the best way to determine RPM is by using a good tachometer (don't use something meant for homeowners or hobbyists). For safety's sake, if possible, take the tachometer readings at the sheave (pulley) end of the shaft rather than the saw end. Also, take several readings, when the saw is both in and out of the cut.

You can also determine your saw's RPM if you know the RPM of the saw motor and the size of the sheaves. To calculate the RPM of the saw, divide the diameter of the drive pulley by the diameter of the driven pulley and multiply by motor RPM. For a gas or diesel engine, you have to know that the engine tachometer is accurate. To be able to rely on an electric motor's nameplate (for RPM information), you have to know that the motor has not been rewound to a different speed.

Here's an example: Given a 10-inch drive pulley, a 30-inch driven pulley and a motor turning 1750 RPM, the saw RPM would equal



To calculate rim speed (in feet per minute), multiply the saw circumference (in feet and tenths of feet) by RPM. NOTE: circumference equals diameter times "pi" and pi equals 3.1416. Using a Mobile Dimension mill as an example, if you have a 30-inch saw, its circumference (in feet and tenths of feet) would be:

(30 ÷ 12) X 3.1416 = 7.854

According to the Mobile Dimension literature, the saw turns at 1000 RPM, and the saw speed would equal

7.854 X 1000 = 7854 (feet per minute)

You can also use the following table:

Table 2

Saw Diameter (inches)	Rim Speed (feet per minute) at _____ RPM - - - - - - - - - - - - rpm - - - - - - - - - - - -									
	400	**450**	**500**	**550**	**600**	**650**	**700**	**750**	**800**	**850**
	- - - - - - - - - - rim speed (surface feet per minute) - - - - - - - - - -									
18	1885	2121	2356	2592	2827	3063	3299	3534	3770	4006
24	2513	2827	3142	3456	3770	4084	4398	4712	5027	5341
30	3142	3534	3927	4320	4712	5105	5498	5891	6283	6676
36	3770	4241	4712	5184	5655	6126	6597	7069	7540	8011
42	4398	4948	5498	6048	6597	7147	7697	8247	8796	9346
48	5027	5655	6283	6912	7540	8168	8796	9425	**10053**	10681
54	5655	6362	7069	7775	8482	9189	9896	10603	11310	12017
60	6283	7069	7854	8639	9425	10210	10996	77781	12566	13352

In general, for good saw performance, a rim speed of 8,000 to 9,000 feet per minute is recommended for sawing hardwoods; 10,000 to 11,000 fpm for softwoods and 6,000 to 7,000 fpm for frozen woods. If you know what your target rim speed is (say, 10,000 fpm for example), and you know your saw's diameter (say, 48 inches), then in order to determine the optimal arbor speed (in RMPs), divide 10,000 by the circumference of the saw (in feet and tenths of feet):

Target rim speed: 10,000 fpm
Saw diameter: 48 inches (48 ÷ 12 = 4.0 feet)
Pi: 3.1416
Circumference: diameter (in feet and tenths of feet) multiplied by pi

10,000 / [(48 ÷ 12) x 3.1416] = **795.8 RPM**

Once again, a table may be handier:

Table 3

Saw Diameter (inches)	Rim Speed (feet per minute) at _____ RPM - - - - rim speed (fpm) - - - -					
	6000	**7000**	**8000**	**9000**	**10000**	**11000**
	- - - - RPM - - - -					
18	1273	1485	1698	1910	2122	2334
24	955	1114	1273	1432	1592	1751
30	764	891	1019	1146	1273	1401
36	637	743	849	955	1061	1167
42	546	637	728	819	909	1000
48	477	557	637	716	**796**	875
54	424	495	566	637	707	778
60	382	446	509	573	637	700

Cutting Edge Width and Side Clearance

The cutting edge of the saw teeth must provide a path (saw kerf) wide enough for the saw plate to clear without making excessive contact with the wood and creating excessive friction. Friction, of course, results in heat and a heat gradient in the saw. This then affects the saw's tension forces, making it nearly impossible to saw accurate lumber. The cutting edge width is the total width of the tooth at its widest point, corner point to corner point. Side clearance is the difference between the plate thickness of the saw and the cutting edge width, divided by two. For example, if your cutting edge width is 0.250 inches and your saw plate is 0.130 inches, then your [total] side clearance is 0.250 minus 0.130 = 0.120. BUT, the total side clearance should be equally divided on each side of the saw, therefore the clearance on each side should be 0.120 divided by 2 = 0.060 inches.

As the cutting edge penetrates the wood, the wood fibers are compressed slightly until they are actually sheared. After shearing, the compressed fibers adjacent to the shear point spring back, nearly to their original position. The side clearance must be sufficient to keep the fibers in the sprung-back position from contacting the saw.

Softwoods, in general, tend to be more "stringy" grained or "fuzzy" grained and therefore do not cut as cleanly or smoothly as do most hardwoods (notable exceptions being basswood, cucumbertree, cottonwood and aspen). Softwoods in general then require somewhat more side clearance than do hardwoods. Typically, softwood sawing requires side clearance from 40 to 50 percent greater than the saw plate thickness while hardwood sawing requires side clearance about 25 percent greater than saw plate thickness.

Less side clearance is required when sawing frozen wood because frozen fibers generally cut cleaner than unfrozen wood. Therefore it is possible for the saw plate to pass through a narrower path. In general, sawing frozen wood requires more power. However you can reduce power requirements by reducing the width of the cutting edge (the kerf), because the fibers cut cleaner and the saw plate can pass through a narrower kerf with out risk of rubbing. To help offset the tendency to underfeed in winter sawing because of increased power demands, use the smallest side clearance practical (i.e., reduce kerf width).

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 (hard/fast) or when sawing large logs. The increased stress must be absorbed by a heavier-gauge saw and teeth. Table 4 shows the recommended cutting edge widths of saw teeth as affected by saw gauge, tooth style and type of log to be sawn.

Table 4. Recommended Cutting Edge Widths of Saw Teeth

Tooth Style	**Unfrozen Softwood**									
	- - - - saw gauge - - - -									
	9/10 (.148/.132)		8/9 (.165/.148)		7/8 (.180/.165)		6/7 (.203/.180)		5/6 (.220/.203)	
	64th in.	*Thous.*	*64th in.*	*Thous.*	*64th in.*	*Thous.*	*64th in.*	*Thous.*	*64th in.*	*Thous.*
F, 2 1/2	17	0.2656	18	0.2812	20	0.3125				
B, 3			18	0.2812	20	0.3125	22	0.3438		
3 1/2					20	0.3125	22	0.3438	24	0.3750
D, 4 1/2							24	0.3750	26	0.4062
Tooth Style	**Unfrozen Hardwood**									
	- - - - saw gauge - - - -									
	9/10 (.148/.132)		8/9 (.165/.148)		7/8 (.180/.165)		6/7 (.203/.180)		5/6 (.220/.203)	
	64th in.	*Thous.*	*64th in.*	*Thous.*	*64th in.*	*Thous.*	*64th in.*	*Thous.*	*64th in.*	*Thous.*
F, 2 1/2	16	0.2500	17	0.2656	18	0.2812				
B, 3			17	0.2656	18	0.2812	20	0.3125		
3 1/2					18	0.2812	20	0.3125	22	0.3438
D, 4 1/2							22	0.3438	24	0.3750
Tooth Style	**Frozen Wood (softwood or hardwood)**									
	- - - - saw gauge - - - -									
	9/10 (.148/.132)		8/9 (.165/.148)		7/8 (.180/.165)		6/7 (.203/.180)		5/6 (.220/.203)	
	64th in.	*Thous.*	*64th in.*	*Thous.*	*64th in.*	*Thous.*	*64th in.*	*Thous.*	*64th in.*	*Thous.*
F, 2 1/2	14-16	0.2188 - 0.2500	16	0.2500	17	0.2656				
B, 3			16	0.2500	17	0.2656	18	0.2812		
3 1/2					17	0.2656	18	0.2812	20	0.3125
D, 4 1/2							20	0.3125	22	0.3438

Next Time: Headrig Power Requirements.

To obtain an electronic copy (Adobe pdf format) of *Circular Sawmills and Their Efficient Operation*, log on to www.fpl.fed.us/tmu. Look under Techlines & Publications.

TROUBLESHOOTING HORIZONTAL EDGERS

In my travels around the State, I have found several instances where people were having trouble with their horizontal edgers. The trouble was that the edgers were making "banana boards" instead of straight boards. This situation can be corrected.

Generally, the banana board syndrome can be traced to either or both of two possible sets of causal factors; either the conveyance system or the saw system. In order to make that determination you must isolate the two. One way to do that is to open up the saws wide, and then convey a very square cant or plank (not overly large) through the edger without it touching the saws. If it feeds like a banana without any influence by the saws, then the problem should be able to be traced to the conveyance system (feedrolls, alignment, etc.). If it feeds straight, then chances are the conveyance system is O.K. The appropriate next step would be taking a closer look at the sawing system (saws, teeth, collars, bearings, etc.).

If troubleshooting a conveyance system problem, consider the following possible causes:

- Feedrolls are worn (hour-glassed or tapered, end to end)
- Feedrolls not parallel with each other
- Feedrolls not perpendicular to the saws (same as: feedrolls not parallel to the saw arbor)

If troubleshooting a saw system problem, consider these possibilities:

- Saws are dished or are being dished by the collars
- Teeth are swaged or sharpened out-of-square
- Saws not of equal sharpness or cutting unequally
- Saws are creeping on shaft
- Hot bearings heating saws and dishing them

LUMBER DRYING UPDATE

Kiln Drying Facilities Grants

Thanks once again to the efforts of the Alaska Forest Association and Senators Stevens and Murkowski and their staffs, wood products manufacturers in Alaska were once again presented with the opportunity to apply for cost-shared grant funding for activities related to the manufacture of dry dressed lumber (and similar products). Combined with the seven projects selected for funding in 2001, Alaska now has a total of 18 projects selected for funding.

In 2001, 39 applications were received, however only projects in Southeast and South-central Alaska were eligible for funding. The seven projects selected in 2001 included:

- Rolando Construction, Ketchikan
- W.R. Jones & Son Lumber Co., Craig
- Viking Lumber Co., Craig
- Icy Straits Lumber Co, Hoonah
- Valley Sawmill, Anchorage & Point MacKenzie
- Poppert Milling, Wasilla
- J&J Enterprises, Willow

In 2002, 27 applications were received; all areas of the state were eligible to participate in 2002. The eleven projects selected in 2002 included:

- Pacific Log & Lumber, Ketchikan
- Alaska Fibre, Petersburg
- Thorne Bay Wood Products, Thorne Bay
- Alaskan Mouldings, Anchorage
- Husky Lumber Co., Nikiski
- Regal Enterprises, Copper Center
- Logging & Milling Associates, Delta Junction
- J&H Enterprises, North Pole
- Alaska Birch Works, Fairbanks
- Nenena Lumber Co., Nenana
- Nelson Enterprises, Chuathbaluk

Lumber Drying Workshops

Due to the events of September 11th, the Lumber Drying/Kiln Operator Workshops originally scheduled for the first two weeks of October 2001 had to be postponed. Fortunately, I was able to reschedule and conduct the workshops in late April / early May 2002. As originally planned, Logging & Milling Associates in Delta Junction hosted one of the workshops and W.R. Jones & Son Lumber Co. in Craig hosted the other.

A total of 18 students attended the two workshops and were taught basic wood science, wood-moisture relationships, lumber handling and preparation, techniques for air-drying, dry kiln systems, and moisture content-based drying schedules. The strength of these workshops lies in the fact that they were conducted at commercial sawmills with operational dry kilns, which gave students the opportunity to receive both classroom and hands-on instruction.

Hosting and/or attending one of these workshops is a major commitment of time, generally requiring an entire week. I commend those people who were willing and able to make that commitment to attend and I am very grateful to our hosts for their hospitality and making their facilities available to us all. I would also like to thank our instructor, Dave Forness, who willingly put up with a rigorous travel schedule; worked 10-12 hours a day and spent more than 2 weeks away from home and family.

NEW PEOPLE ON WOOD UTILIZATION CENTER STAFF

Geoffrey Donovan, who completed his Ph.D. in Forest Economics at Colorado State University in May 2001, joined the WUC staff on November 4, 2001. Much of Geof's research focus has been on forest fire related economics, but says he is anxious to work on economic conditions that are related to the wood products industry in Alaska. His phone is (907) 747-4310. This position was vacated when Pete Tsournos accepted a teaching and research position with the University of California in Chico.

Joseph Roos has been selected fill a post-Doctorate position in Forest Products Marketing. Joe has been working for CINTRAFOR while working on his Ph.D. at University of Washington. He'll be on the WUC payroll as of June 16th but will be stationed in Seattle until early Fall when he'll relocated to Sitka. Until he gets to Sitka, Joe can be reached at (206) 616-1188.

For more information contact Kenneth A. Kilborn, Team Leader, Wood Utilization Center, 204 Siginaka Way, Sitka, AK 99835, Phone: (907) 747-4308 Fax: (907) 747-4307.

MARKETING

Export Sales

For those of you that are not "in the loop", you should know that the Alaska Department of Community and Economic Development (DCED) routinely generates trade leads and distributes those leads via fax, e-mail and hard copy. Those leads can also be reviewed on the DCED web site at http://www.dced.state.ak.us/cbd/wood/tree6.htm. If you are not in the loop and would like to be, contact Michael Johnson, at (907) 269-8112 or by e-mail at Michael_Johnson@dced.state.ak.us.

Since foreign trade leads often specify metric sizes, a review may be helpful. Metric sizes are all based on the meter, which is equivalent to 39.37 inches. There are 100 *cent*imeters in a meter (just like there are 100 *cent*s in a dollar). There are 1000 *mill*imeters in a meter (just like there are 1000 years in a *mill*enium). There are 10 millimeters in a centimeter. There are 2.54 centimeters in an inch and 25.4 millimeters in an inch.

As an example, here are the specifications for a lead that was posted in September for some hemlock lumber:

Size: 16cm x 22cm x 250cm
Grade: economy
Treatment: rough
Ocean shipping: bulk (not in container)
Payment: L/C (L/C means Letter of Credit)
First order: 3000 cubic meters
2nd to 5th order: 10,000 cubic meter/each order

To convert the metric sizes, divide each cm measurement by 2.54 to get the inch equivalent:

16 cm ÷ 2.54 cm per inch = 6.299 inches
22 cm ÷ 2.54 cm per inch = 8.661 inches
250 cm ÷ 2.54 cm per inch = 98.425 inches (divided by 12 inches per foot = 8.2 feet)

The lead also states that the first order is for 3,000 cubic meters. So, what the heck is a cubic meter? You can visualize a cubic meter like a cubic yard -- approximately 3 feet by 3 feet by 3 feet, except that it's in meters. (Remember a meter is 39.37 inches, whereas a yard is 36 inches). A cubic foot of solid wood, 12 inches by 12 inches by 12 inches, contains 12 board feet (a board foot is 12 inches by 12 inches by 1 inch). A cubic yard contains 27 cubic feet (3 x 3 x 3 = 27). At 12 board feet per cubic foot, a cubic yard would contain 324 board feet (27 x 12 = 324). A cubic meter would be somewhat larger.

Another way to make the conversion is on a cubic inch basis. A board foot (12 inches by 12 inches by 1 inch) contains 144 cubic inches. A cubic foot (12 inches by 12 inches by 12 inches) contains 1,728 cubic inches. To determine the number of board feet of solid wood in a cubic foot of solid wood, divide 1,728 by 144. The answer is 12. A cubic meter measures 39.37 inches by 39.37 inches by 39.37 inches and contains 61,023.378 cubic inches. Dividing that by 144 (the number of cubic inches in a board foot) tells you that the number of board feet in a cubic meter is 423.77. Most people round it up to 424.

The first order is for 3,000 cubic meters. At 424 board feet per cubic meter, that's quite a bit of wood. How much wood? Multiply 3,000 by 424 to get the answer (3000 x 424 = 1,272,000 board feet). Subsequent orders would be for 10,000 meters per order (10000 x 424 = 4,240,000 board feet).

Most foreign trade leads are for large orders, such as these. That shouldn't necessarily discourage you from exploring them. Most buyers recognize that these orders are unlikely to be filled by one supplier and, out of necessity, break such orders into smaller units. If exporting is foreign to you, you would be well advised to work through a broker. If you are already working through a broker, it might be a good idea to bring these leads to his attention as they arise. It is also possible, and perfectly legal, for suppliers to work cooperatively to fill export orders. This is the rationale behind the Export Trading Company Act of 1982.

Domestic Sales

Are you a "seller" or a "marketer"? "What's the difference", you may ask? The differences are vast, but basically boil down to a fairly simple concept. As applied to a sawmill, a seller 'saws it then sells it; a marketer sells it then saws it'. Do you see the difference? Selling is a passive activity. Marketing is a [pro]active activity. If you've sawn all your logs into 2x4s and 2x6s, then all you can do is wait for someone to come along that wants to buy 2x4s and 2x6s. Yes, you can advertise that you have 2x4s and 2x6s for sale, but if someone wants to buy something other than 2x4s and 2x6s, you're S.O.L. (Sorry, Outta Logs); you can't supply them without going out and getting more logs and sawing them to order. Hopefully the customer hasn't gone down the road to the next sawmill in the meantime.

A marketer advertises his ability to produce on demand. His attitude is one of customer service. He maintains a high degree of flexibility. If you've bucked all your logs into 20-foot lengths, once again, you're S.O.L. if someone comes along with a fat wallet wanting to buy 24-footers. I can't begin to guess how much lumber I've seen going gray and moldy in the back of somebody's lumber yard, because they sawed it before they had is sold. What was once Common & Better turned into pallet lumber and dunnage.

With recent developments for additional capacity to add value to our wood, manufacturers will likely have to or want to look beyond local markets for potential outlets. Marketing is a critical part of the manufacturing process. As you develop your abilities to make a greater variety of more highly-processed products (value-added), out of necessity you will also spend more time looking for the opportunities that will give you the highest returns on your investments and efforts. Where and how do you find such market opportunities? In the not-so-distant past, newsletters, industry directories, marketing bulletins and trade publications were the primary sources of most domestic trade leads. Attending meetings, conferences and workshops provides opportunities to meet other people in the industry and cultivate business relationships. For Alaska manufacturers wishing to sell to the Lower 48, another key marketing element would be to develop a relationship with a trustworthy broker. In the last 5 years or so, a new tool has come along that could play a role in a company's marketing strategy -- the Internet. If you haven't made the Internet a part of your business (e-mail at the very least), I would encourage you to get on with it! To see some examples of Alaska wood products web sites, check http:// www.masterstouchmfg.com, http://www.woodbowls.com, http://www.northlandwood.com, and http://www.whitespruce.com.

There is also another very effective marketing tool that deserves your consideration -- trade shows. I know some of you have attended the Wood Technology Clinic in Portland, and some of you have even had booths and displays at local events and gifts shows. Events like these bring a lot of people together for one purpose -- to make buying

decisions. Approached in the right way, trade shows are not just one-way venues for sales. Customers can be found on both sides of the table, so to speak.

For a number of years I was involved in trade show participation back East. We started small but grew quickly. We would buy one or two booths at regional shows and put a half-dozen or so companies in that space; splitting the costs of the booth space, the display and the transportation of show materials (samples). Companies were free to send their own representatives (at their own expense) or we would do our best to represent them by showing their products, distributing business cards/literature, and taking contact information from potential customers. With demonstrated successes, the effort grew to include large national and international shows (Atlanta, Anaheim, Tokyo, Cologne, Montreal). One of the largest wood products trade shows in the world takes place in Atlanta in even-numbered years. The dates for this year's International Woodworking Machinery & Furniture Supply Fair (IWF for short) are August 22-25. There will be 800,000 square feet of exhibit space and about 50,000 attendees. For more information, go to http://www.IWF2002.com.

In odd-numbered years, the IWF shifts to the west coast (Anaheim). The dates for next year's show are July 31-August 3. The Anaheim show is about half the size of the Atlanta show, but that is still very big. The exhibit space is about 400,000 square feet and there are nearly 20,000 attendees (many from the Pacific Rim and South and Central America). (For more information go to http://www.AWFSFair.org or http://www.woodworkingfair.org). I know these are very busy times for operators in Alaska, but much of the rest of the industry schedules construction projects, maintenance downtime and vacations in July and August, making it fairly easy for managers to attend these shows. I would like to see a contingent of Alaska manufacturers attend the show in Anaheim next year. It might even be possible to have a booth if enough people are willing to participate and put forth the effort. Caution: Attending a show as an exhibitor is a lot of work and it's not cheap, if done properly (if not done properly it's not worth doing). If this is something of interest to you, check the web sites and then let me know. A year is not too soon to start planning.

THE FUTURE VALUE OF MONEY

One of the most powerful lessons I learned in economics class (about 100 years ago) is the concept of "the future value of money". You may have heard, and I am sure you would agree, that a dollar isn't what it used to be, or that a dollar won't buy today what it bought 20 years ago. This is due to cost-of-living-adjustments, inflation and interest.

If you've ever borrowed money, you know that, in addition to repayment of the principle, you must also pay interest on the outstanding balance (the amount of principle still owed). If you've borrowed a great deal of money at a high interest rate with a long repayment schedule, you could wind up paying back several times what you initially borrowed. In a similar vein, if you are making investments, in a retirement account for example, you might like to know what you can expect to have when [if] the time comes to retire. These things can be calculated fairly easily using the *compound interest formula*.

The compound interest formula is a bit of algebra, with one just one difficult part. The difficult part involves raising a number to a power. This can be done quite easily on most modern calculators (with something more than the basic addition, subtraction, multiplication and division). "Raising a number to a power" simply means multiplying a number by itself a certain number of times. For example "two raised to the second power" means 2 times 2; "two raised to the third power" means 2 times 2 times 2; "two raised to the fourth power" means 2 times 2 times 2 times 2, and so on. Using numbers, these statements would be written as follows: 2^2, 2^3, and 2^4.

On my calculator, there is a button labeled x^y. That button allows me raise any number (represented by "x") to any power (represented by "y"). For example, if I wanted to find the answer to 2^3, I would push the buttons on the calculator in this order: **2**, **x^y**, **3**, **=**. The answer is 8. If I wanted to find the answer to 2^4, I would push: **2**, **x^y**, **4**, **=**. The answer is 16. What is the answer to 2^5? Now that you know all about raising a number to a power you are ready for the compound interest formula. Here it is:

$$V_f = V_p \times ((R_d+1)^y)$$

Here's what the formula says in English: the Value in the future (V_f) equals the Value in the present (V_p) times the (Rate of interest in decimal form (R_d) plus 1) raised to the "y" power. "y" represents the number of years. NOTE: Another important thing to remember is to always perform the calculations inside the parentheses first.

Let's consider an example. Say you bought a 30-year bond, paying 6.5% interest for $1000. After 30 years, how much would your original $1000 investment be worth?

The Value in the future (V_f) is what we want to find out. The Value in the present (V_p) is **$1000**. The Rate of interest in decimal form (R_d) is 6.5 ÷ 100 = **0.065**. The number years (y) is **30**. So our formula becomes:

$$V_f = 1000 \times ((0.065 + 1)^{30})$$

1. Perform the calculation inside the inner parentheses first: 0.065 + 1 = 1.065
2. Next, raise 1.065 to the thirtieth power: 1.065^{30}. On your calculator, if it's the same as mine, push **1.065**, **x^y**, **30**, **=**
3. Multiply by $1000.
4. The answer I get is $6,614.37

OK, here's a test. John and Jim are twin brothers. At age 21, John starts a retirement account and invests $2000 each year until age 30 (10 years), at which point he doesn't make any more annual contributions, but lets what he's invested so far "ride". At age 31, Jim starts his retirement account and invests $2000 each year until age 60 (30 years). Both retirement accounts pay 7.5% interest annually. On their 60th birthday, how much cash has each brother put into his account? Which brother has more money? How much more? Hint: to find the answer you have to use the compound interest formula for each year of their investments. The first correct solution gets a 50% tuition waiver to my next workshop. Good luck.

SERVICES TO THE INDUSTRY

Lumber Grading. As you may or may not know, our resident WWPA Lumber Inspector, Mike McGuigan, has relocated. Mike still provides grading services in Alaska on a monthly basis, but, apparently, there isn't enough happening here to keep him busy full-time, year round. Mike is now working out of the WWPA offices in Portland. He can be reached at (503) 306-3467. Don't hesitate to call him if you need his assistance.

Saw, Knife and Tool Grinding and Sharpening. With all the new planers and moulders coming on line, you may be wondering where you can get knives sharpened or profiles ground. Two service companies have come to my attention recently. You mat want to contact them: Mark Knapp, The Cutting Edge, Fairbanks, (907) 452-7477 and Richard McGuire, McGuire Grinding, Arlington, WA (360) 474-9616.

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