Management of Westvaco's 520,000-acre tree farming operation in South Carolina includes the annual requirement to thin approximately 14,000 acres of pine forest land. For several years now we at Southern Woodlands have been actively seeking a viable means of accomplishing this work. Our current state of the art is to remove "excess" growth from a plantation only once...at a time when a stand is between 12 and 15 years of age, or, near the mid point of a 30-year rotation cycle. Specially trained production crews accomplish this through the use of chain saws, portable skidding winches and plenty of old-fashioned manual labor. When the concept was introduced it was considered somewhat unique in this age of increased mechanization and automation. We call our revolutionary method "The Westvaco Thinning System".

Historically, our thinning efforts have followed the same patterns as the forest industry in general. The first efforts were accomplished by shortwood operators in 25-year-old natural or seeded stands. At that time the rotation for pine was 45 to 50 years. Also, more than one thinning would have been done. These stands were on typically high ground and were suited to this treatment. With the intensified conversion program and the increase of pine stands on lower ground, coupled with bedding, came the need to re-think the system required. This was accelerated by the disappearance of the shortwood producer and the increased incidence of mechanization. This led to mechanized operations requiring shears; corridor thinning was the first direction giving way to row thinnings. These were the basic systems with variations evolving to take advantage of the possibility to introduce a degree of selection when terrain allowed.

These systems will work but when the pros and cons are weighed the systems are found to fall short of the target in our South Carolina coastal plains region. First, relatively large machines are required to negotiate the beds. The machines cycle over the same ground frequently. Even where ground conditions
are ideal there is a great opportunity to cause soil compaction and root damage. This is enhanced by the frequent entry points of the equipment, and the close proximity of each subsequent entry to adjacent points of entry as is necessary with either row or corridor thinnings. As is universally recognized, row thinning systems are—at best—partial crop cuts. Row systems do release the remaining stand for continuing growth but, because of the fact that the stand is not culled for the less desirable trees, the overall recovery is not as effective as it would be if only the best and most thrifty trees were left to grow.

Westvaco had previous experience with a Swedish consulting firm known as "Nordfor". This company has been used in Brazil with good results; our Timberlands Division manager, Mr. Scott Wallinger, invited them to come to South Carolina to survey the situation and make recommendations.

Nordfor is a firm that specializes in logging systems and techniques. They have worked extensively with the forest industry in Scandanavia and other European countries. While their venture with Westvaco was the first of its kind in the United States they have done a lot of work in South America and South Africa.

The system as developed in South Carolina applies to young pine plantations. For optimum results it requires straight rows and a good density of stems—that is, in excess of 500 stems per acre. The optimum DBH is about 7.5 inches. Above this size the cutters efficiency drops off and the system requires modification. When the stand falls below 5.0 inches DBH, the cutter is unable to cut sufficient trees to meet production volume goals.

Basically the system consists of a five-man crew—three cutters and two winch operators. The cutters are goaled to produce 3,000 trees per week and the winch to skid this production to roadside. Each cutter works with a drift or rack comprising four rows of trees. He starts cutting at the back of the rack which is, on average, 150 yards long. Working with a system of overlapping circular plots of 6.12 meters radius, he selects the 8 trees to remain. Using directional felling and other techniques the trees are placed on the ground, with either the butts or tops in the center of the rack and with the stems running diagonally back from the direction of skid.
Trees are placed in bunches of two or more to a bundle. From the winching stand the bundles form a "V" or herringbone pattern. Those trees which are felled forward are delimbed. Otherwise, no limbing is done.

The winch is a small ground skid machine with a rehaul or haul back line. The functions of the winch are controlled by tone-modulated radio signals. There are two operators with the winch: one, at the tractor, has a transmitter with 8 functions...while the second, in the woods, has a transmitter with 6 functions. Switches on both units are of the toggle, "dead man" type and for additional machine protection and safety, the tractor operator has an override stop. Control of the functions is passed from one transmitter to the other by activating a special signal. As long as one transmitter has the control function, the other cannot operate any function with the exception of the tractor operator's override stop.

The winch is equipped with electric-over-hydraulic valves. The main line is 5/16-inch cable and the haul back line is 1/8-inch cable. The main line drum holds approximately 400 yards of line while the haul back drum has a half mile of cable. The main line drum is powered; its functions are to store line, retrieve the line as it returns over the capstan and apply sufficient pressure to the line wrapped on the capstan in order to prevent slippage. The main pulling force of 4,000 pounds is supplied by the capstan winch. The haul back line returns the empty sled (a lightweight "nose cone" designed to prevent load snagging) and chokers (a chain "noose" device) to the crewmember in the woods.

When setting up the winching operation the haul back line is taken back from the tractor and attached to a tree with a nylon strap and a snatch block. The line is then taken to the back of the rack between two rows of trees. Another corner point is established and the line is carried on a right angle to the rack to be skidded. There, the third corner is set up...also through the use of a nylon strap and a snatch block. The haul back line is then taken straight back to the tractor where it is attached to the main line which carries the sled and chokers. Winching then starts at the point nearest the tractor and progresses to the rear of the rack.

The racks are set up to produce about 120 trees. More than this and the sled will have difficulty coming up onto the pile. Fewer stems mean conditions
too sparse for effective winching.

When the last turn is choked, the field operator disconnects the haul back line from the main line and sends the last load to the tractor positioned at roadside. While the final load from that rack is going in the choker setter moves the haul back line across to the next rack where the third snatch block is again set up. He starts up the rack and meets the tractor operator who has moved the tractor into position as soon as he cleared it of the last load.

Each turn of trees skidded averages 8 trees or approximately one quarter of a cord. Initial set-up of the winch takes about 10 minutes while each relocation requires 5 to 6 minutes. There is sufficient line on the haul back line to work for about five days without retrieving it and starting again.

Unfortunately, however, the set-up qualifies as an attractive nuisance and is subject to vandalism. Because of this the tractor has to be moved and concealed overnight.

The crew of five, that is, three cutters and two winchers—choker operators and tractor operators—is gauged to produce 120 cords of wood per week. When planning and designing the system, every effort was made to provide the worker with an interesting occupation: one in which he could see evidence of a job well done...and one in which he could feel mentally stimulated. The selection of trees to be cut and planning of the manner in which the trees will be placed provide interest and variation to the work. And, teamwork is essential. The cutter must place felled trees on the ground correctly in order for the winch operator to meet overall production goals.

Because of the nature of the work, extra emphasis was placed on worker comfort and safety. Employees are issued nylon trousers which have a chain saw "guard" feature sewn into them. This protection extends from the groin to the ankle. The weave of the pants, nevertheless, is loose enough to allow ample air circulation. Leather safety boots and rubber boots are also available and, again, these have nylon protective inserts. Special hard hats are equipped with noise barriers for ear protection as well as nylon face shields. Open front raincoats, tool belts, tools and first aid kits are standard items of equipment, too, as are combination gasoline and lubricating oil cans.
We are presently using the Husquavarna Model 340 chain saw with a 13-inch bar. This particular saw was selected because it has the safety features desired, plus it is light, rugged and durable.

We have initiated a new operation at a time when, generally, the logging industry is swinging heavily towards mechanization. The philosophy in our area is to do it with machines and it is not unusual to see an advertisement for a good chain saw operator go unanswered. Despite inflation today, most young persons' thoughts continue to focus on "motors on wheels." This is a problem to us for two apparent reasons: First, we need keen young woodworkers to continue our operation and, secondly, because the price and supply of fossil energy is becoming a serious national factor. Small stems and low volumes demand low costs. The most urgent task before us now is to locate and identify the people who want to do this type of work.

The basic training period for an individual involved in this occupation lasts from between 6 to 8 weeks but this is followed by another 6 to 8 weeks of actual work before one is reasonably proficient. There are many small yet important points; aptitude, perception and interest play a very important part in determining how soon a worker masters the technique.

Because of the training necessary to replace dropouts, this system has not reached a point of development where an independant producer could undertake its use. In time, hopefully, this situation will change as, environmentally, the concept is sound.

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The author, coordinator of all logging activities in Westvaco's Southern Woodlands region, is a graduate of Rhodesia's Umvuma School of Forestry.