



Processing



Processing

- Felled trees should be processed for transport from harvested sites.
- Processing includes:
 - Delimiting,
 - Topping, and
 - Bucking.



Objective of Processing

- To produce the products desired by the marketplace with:
 - acceptable product quality,
 - a minimum of fiber or value loss, and
 - an acceptable per unit cost.
- The logger's objective should be to:
 - “merchandize” all harvested products to the markets,
 - bring the highest possible value.



Processing

- Product types depend on species being processed and the end product specification.
- Basically, three types:
 - Tree-length
 - Logs
 - Chips
- The most common products delivered to markets in the Central Appalachia or West Virginia are logs with different lengths.



Potential Processing Loss

- To loggers:
 - If timber has been purchased on a **lump-sum basis**, inattention to bucking decisions can create a financial loss to the logger or timber buyer.
- To landowners:
 - When timber has been purchased on a **“per unit of volume” harvested basis**, the loss associated with miss cut logs is borne by the landowner.



Delimiting

- Sawing branches from a felled tree is known as delimiting.
- Depending on the operational requirements, it is done:
 - prior to the bucking and skidding operations
 - either in the woods or at landing
- Two delimiting methods:
 - Manual
 - Mechanical



Manual Delimiting

- Prior to the development of chainsaws, delimiting was primarily performed by:
 - axe, and
 - single-man crosscut saw
- Nowadays, chainsaws:
 - are the only major manual delimiting tools in North America.
 - are smaller and lighter than saws normally used for felling trees.



Manual Delimiting

- Hazardous but also fatiguing
- Extremely flexible:
 - Can be used in a wide range conditions at the stump or on landing
 - Can be used to delimit both hardwood and softwood species
 - Is capable of handling poorly formed trees



Mechanical Delimiting

- Mechanized equipment
- More suited to delimiting softwood stems with straighter boles and smaller limbs than large limbed hardwoods.
- Four categories:
 - Single-stem delimiting with lengthwise feeding
 - Single-stem delimiting with transverse feeding
 - Multi-stem delimiting with lengthwise feeding
 - Multi-stem delimiting with transverse feeding



Delimiting Methods

- Most mechanized delimiting equipment uses lengthwise feeding.
- The most productive method should handle multiple stems.
- There are about **five conventional mechanical delimiting methods** used in the eastern United States.



Mechanical Delimiting Methods

- ◉ Delimiting gate or grid
- ◉ Pull-through delimiter
- ◉ Stroke delimiter
- ◉ Grapple processor
- ◉ Chain flail delimiter



Delimiting Gate or Grid



- The most popular mechanized multi-stem delimiting method used in the South.
- Consists of a tubular steel grid that is:
 - either free-standing on steel legs
 - or supported by chaining it to trees



Delimiting Gate



- To delimb, the grapple skidders
 - pull a load of pine trees in front of the gate and
 - back the bunched trees into grid
 - limbs are broken off as stems pass through the square openings of the gate



Delimiting Gate

- Handles multiple stems quickly and effectively
- Requires only a small capital investment
- Cannot delimb very well for small trees
- Hardwoods with large limbs cannot be delimbed in the gate.



Delimiting Gate

- Requires a large area to be set aside near the landing for delimiting.
- Skidder traffic is concentrated in this area.
- Quality is often poor.
- Additional chainsaw delimiting is required in some cases.



Pull-through Delimber

- Consists of an inverted grapple
 - with delimiting knives on one side of the grapple
 - mounted on a knuckleboom loader



After the loader operator lays a tree in the grapple,

- the knives are hydraulically clamped against the stem
- tree is pulled through the device.
- the delimiting knives shear off the limbs as the operator pulls the tree through.



Pull-through Delimber





Pull-through Delimber

- Is relatively inexpensive to purchase (\$30,000)
- Is powered by the loader's hydraulic system
- Reduces the loader's productivity
- Many loggers use it to mechanize the final delimiting work
- Safety of the operation is improved



Stroke Delimbers

- Have been used in Canada for years where delimiting at roadside is common.
- Are usually mounted on tracked carriers such as excavators.
- Use the same delimiting principles as pull-through delimiters, except
 - the tree remains stationary and the knives are moved along the stem.



Stroke Delimbers

- The knives are mounted on a boom
 - which extends along the length of the stem,
 - delimiting the stem as the knives move across limbs
- Topping and bucking functions can also be performed by the stroke delimeter equipped with a chainsaw or attachment.
- Bucking decisions are often aided by length measurement devices



Stroke Delimbers



Delimiting and Bucking



Stroke Delimber





Stroke Delimber

- Tracked carrier has slow ground speed,
 - thus most stroke delimiters typically work at fixed locations along roads or on landings
 - skidders bring them full trees
- As a result, skidder traffic is concentrated in a specific area and large piles of debris tend to accumulate.
- Is quite expensive to purchase (\$200,000+).



Grapple Processor

- Performs both delimiting and bucking functions
- Uses the techniques similar to pull-through and stroke delimiters
- A grapple processor resembles
 - the grapple of a knuckleboom loader
 - with the addition of feed rollers, delimiting knives, and a topping/bucking saw



Grapple Processor

- The operator picks up trees with the grapple
- The feed rollers push the tree horizontally through the grapple
- Limbs strike the delimiting knives on the inbound side
- The saw on the outbound side buck the stem to logs

Chain Flail Delimber



This is the Peterson Pacific Corp. DDL 5200-B,
a self-loading portable Flail Delimber/Debarker.



Chain Flail Delimber

- Not only delimb but also debark stems
- Clean stems can be provided to produce “clean” fiber chips in the woods
- Is often used today with whole-tree chipping operations
- Can also be used to delimb roundwood products
- Can be mounted to a rubber-tired loader



Comparisons (Manual and Mechanical Delimiting)

- Manual:
 - Flexible
 - Low capital
 - Labor intensive
 - Hazardous
 - Expensive to insure workers
- Mechanical:
 - Multiple stems



Bucking and Topping

- Bucking is the process to:
 - cut a tree-length stem into logs, bolts or random lengths
 - make preparation for skidding, forwarding, yarding, or hauling
- Topping is essentially the last bucking cut that removes the undelimited top portion of the tree.



Bucking and Topping

- Both functions can be performed:
 - manually with chainsaws or mechanically
 - at the stump or on landing
- Bucking in WV:
 - Bucking with a sawbuck attached to a loader is a typical description in WV.
 - In some other cases, bucking is also done with chainsaws.



Mechanized Bucking Methods

Slashers and sawbucks

- Slashers and sawbucks are the most common mechanized methods of bucking.
- These operate in conjunction with a loader at the landing.
- Are relatively inexpensive to purchase, and
- Require minimal maintenance to operate.



Sawbuck





Factors Affecting the Bucking Operations

- Timber size
- Market demands
- Equipment limitations
- Transportation restrictions
- Log grades



Bucking Decisions

- Bucking decisions are critical to:
 - correctly manufacturing a log,
 - maximizing the value produced from each tree
 - maximizing the value of a stand, and
 - recovering the money spent on purchasing the tract of timber.

Bucking Options

<p>Tree stem: DBH 14 inches</p> <p>Weight o.b. 4" top 1,447 lbs.</p> <p>Weight o.b. 8" top 1,248 lbs.</p>	<p>Pulpwood Price \$11/ton</p> <p>Chip-n-saw Price \$24/ton</p> <p>Plylog Price \$34/ton</p>
<p>Scenario #1: 33' of plylogs, remainder pulpwood</p>	<p>Plylog 0.62 tons \$21.22</p> <p>Pulpwood 0.11 tons \$1.20</p> <p>Total stem value \$22.42</p>
<p>Scenario #2: 33' of chip-n-saw, remainder pulpwood</p>	<p>CNS's 0.62 tons \$14.98</p> <p>Pulpwood 0.11 tons \$1.20</p> <p>Total stem value \$16.18</p> <p>Percent value lost 28%</p>
<p>Scenario #3: Entire stem sold as pulpwood</p>	<p>Pulpwood 0.72 tons \$8.07</p> <p>Total stem value \$8.07</p> <p>Percent value lost 64%</p>



What is Chip-N-Saw?

- Registered trade name for a machine that
 - makes small logs into cants,
 - converts part of the outside logs directly into chips without producing any saw-dusts
 - cants are then sawn into lumber as part of the same operation