Felling

Felling

- While performing felling operations, we have to consider to:
  - minimize damage to log products
  - maximize product value
  - leave stumps as low as possible
  - maximize the fiber utilization
  - protect boundary trees, neighboring property,
  - follow regulations such as BMPS, OSHA

Felling Methods

- **Manual felling**
  - chainsaws
- **Mechanized felling**
  - felling machines such as feller-bunchers and harvesters

Manual Felling

- Chainsaws
  - are the main tools.
  - are responsible for one of the most radical changes in logging technology in the 20th century.
  - prompt rapid productivity gains.

Chainsaws

- Introduced to North America during World War II.
- Early models:
  - heavy - 50 pounds or more
  - two persons to operate them
- Today's models:
  - lightweight - less than 20 pounds and many less than 10 pounds
  - powerful and fuel-efficient with less vibration and safety features

Procedures
(Chainsaw Felling)

- Walk to tree
- Acquiring
- Felling
- Delimbing and topping

Mechanized Felling

- Mechanized equipment designed to fell trees became popular in the 1960's.
- High quality, reliable hydraulic systems made the modern feller-bunchers and harvesters possible.
- Felling machines can be classified or described in terms of:
  - the way the machine being operated,
  - the felling head used

Felling Machines

- Felling devices or heads can be mounted on several types of machine carriers or prime movers.
- These are typically grouped into two types:
  - Drive-to-tree machines
  - Swing-to-tree machines

Drive-to-tree Machines

- Either rubber-tired or tracked machines which drive to each tree before cutting it.
- Less expensive to purchase and operate, and most widely used.
- More productive in scattered stand than swing-to-tree machines.
- Applications:
  - Four wheeled models are frequently used for clearcut
  - Three wheeled models are popular for thinning

Drive-to-tree Feller-buncher (Four-wheel)

Drive-to-tree Feller-buncher
(Three-wheel)

Drive-to-tree Feller-buncher (Three-wheel)

Swing-to-tree Machines

- Mount the felling head at the end of a boom.
- Reach trees by extending the boom away from the machine.
- Typically cut and process several trees before the machine physically moves to a new location.

Swing-to-tree Machines

- Usually have tracked undercarriage giving them a relatively slow ground speed.
- Are expensive to purchase and operate.
- Their fast boom cycle times make them more productive in dense stands since they cut several trees without move.
- Preferred for soft ground conditions or in sensitive areas such as wetlands.

Swing-to-tree Feller-buncher (Tracked)

Swing-to-tree Harvester (Tracked)

Swing-to-tree Harvester (Wheeled)

Combi Harvester

Valmet's Combi Machine can be seen here in its conventional guise. A
Wood it will be demonstrated in a thinning stand with closed processing.
The Combi Machine Valmet 801 Combi is a combined harvester and for
which fells the trees, processes them directly into the load space as a ru
then brings out the timber to the landing.

Felling Head

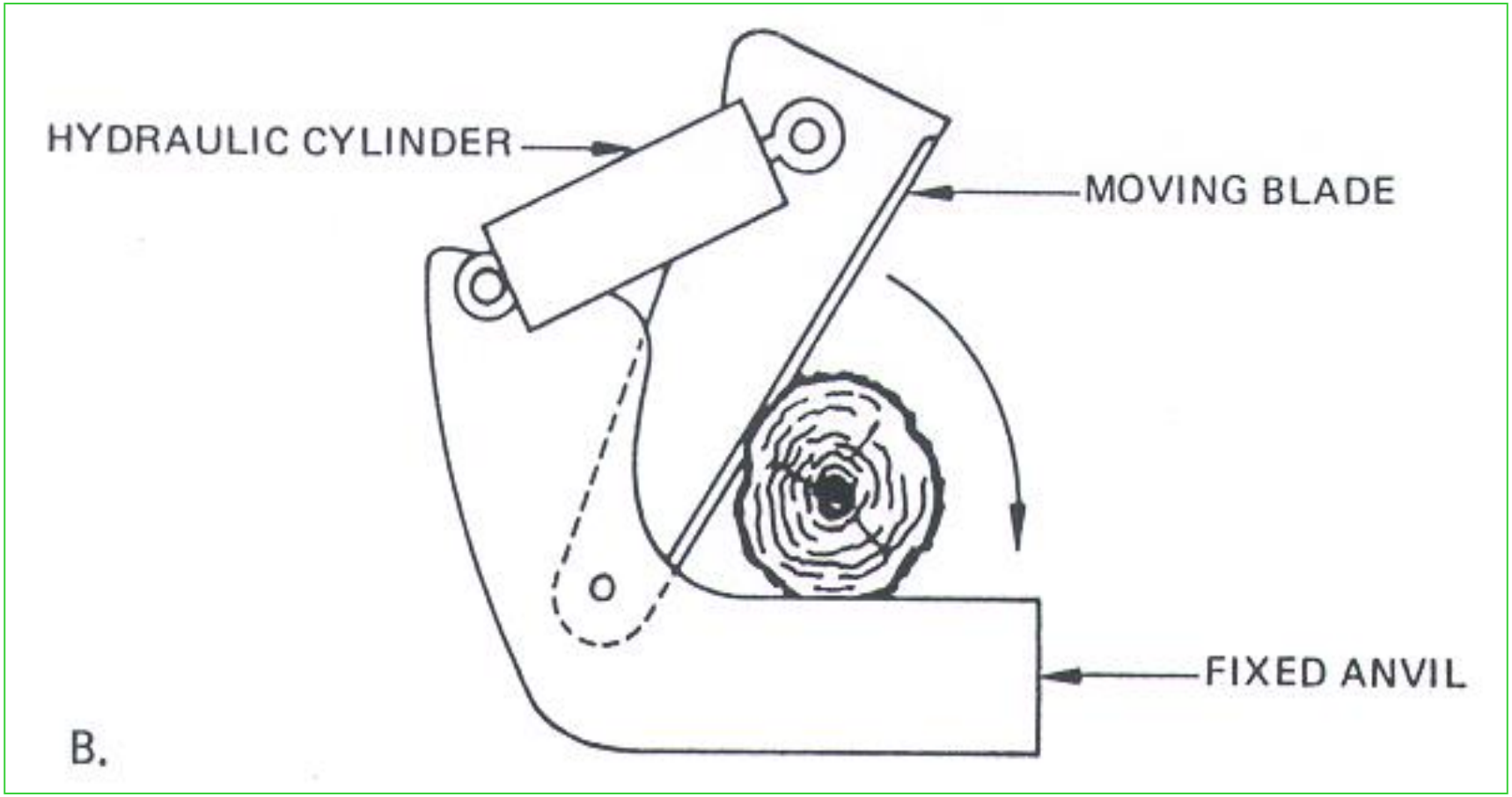
- A cutting unit or mechanism mounted in the front of a feller-buncher or on the boom of a harvester.

- Generally two types:
  - Shears
  - Saws

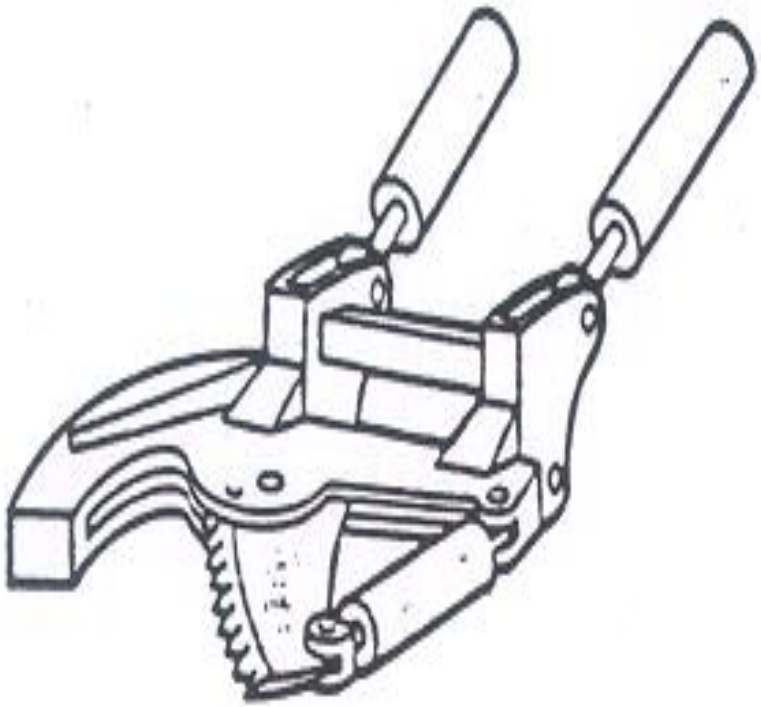
Shears

- Shears were frequently used in early felling equipment. Basically two types:
  - Directional shears (or single-action shear) – operate like ordinary pruning shears; one movable blade works against an anvil.
  - Scissors shears (or double-action shear) – work like a pair of scissors; that is, there are two offset blades working against each other.

Single-action Shear

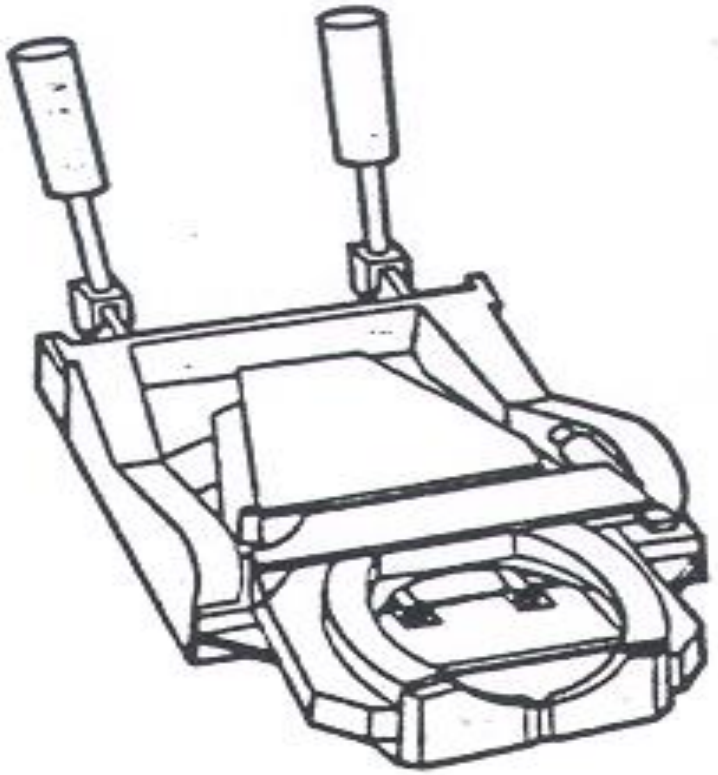


Single Action Shears



Pivoted Single Blade

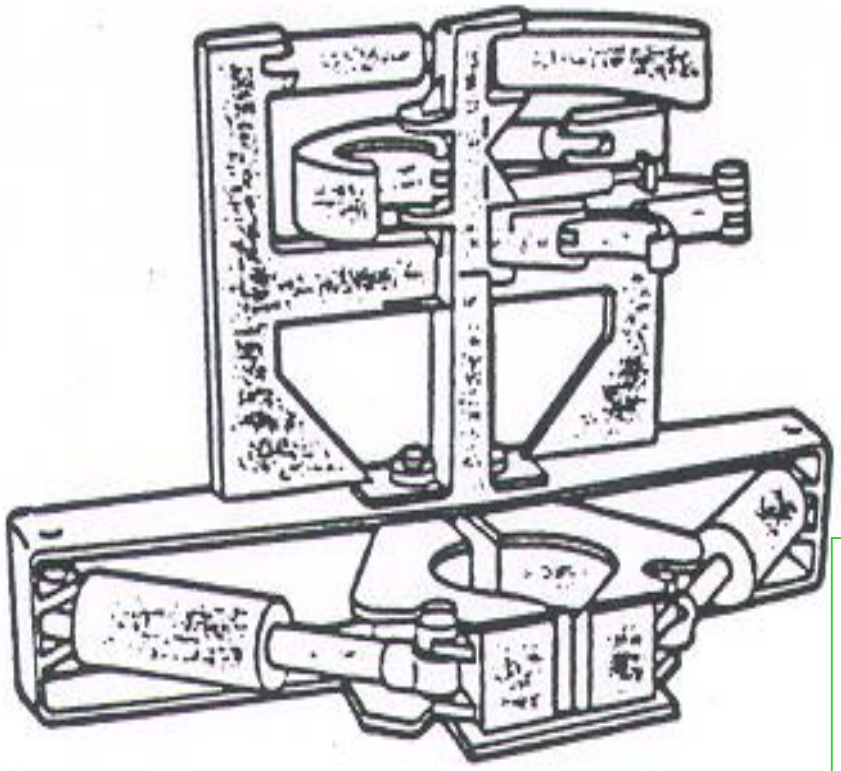
Guillotine

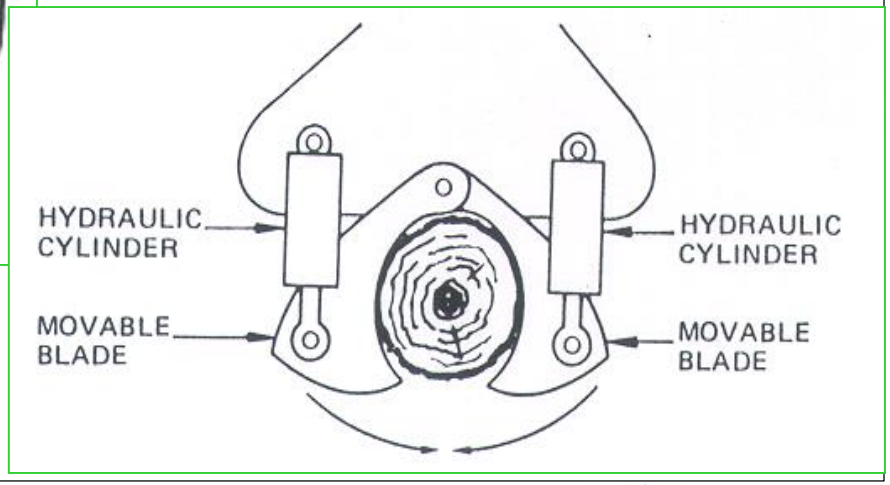


Single Action Shear

- Designed to replace chainsaws.
  - no carrying capability, so trees fall where they cut.
  - no way to accumulate bunches of trees.
  - cheap and able to handle large-diameter trees.

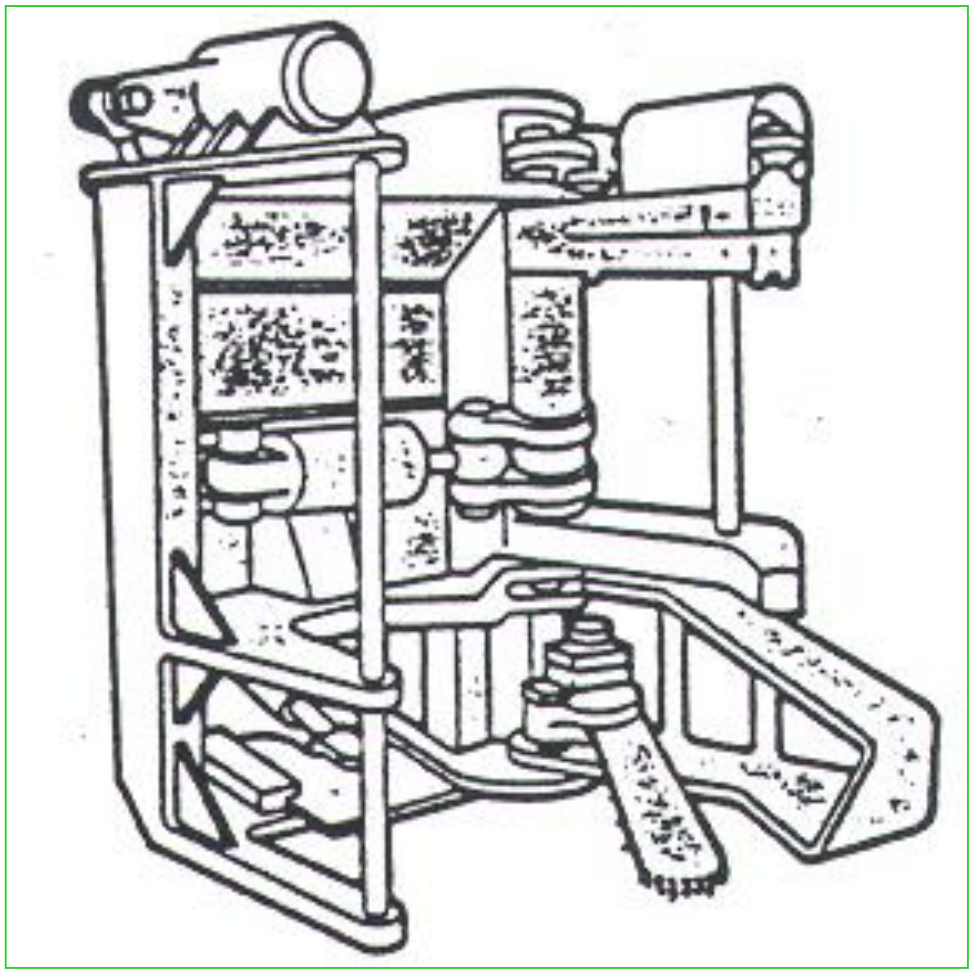
Double Action Shear





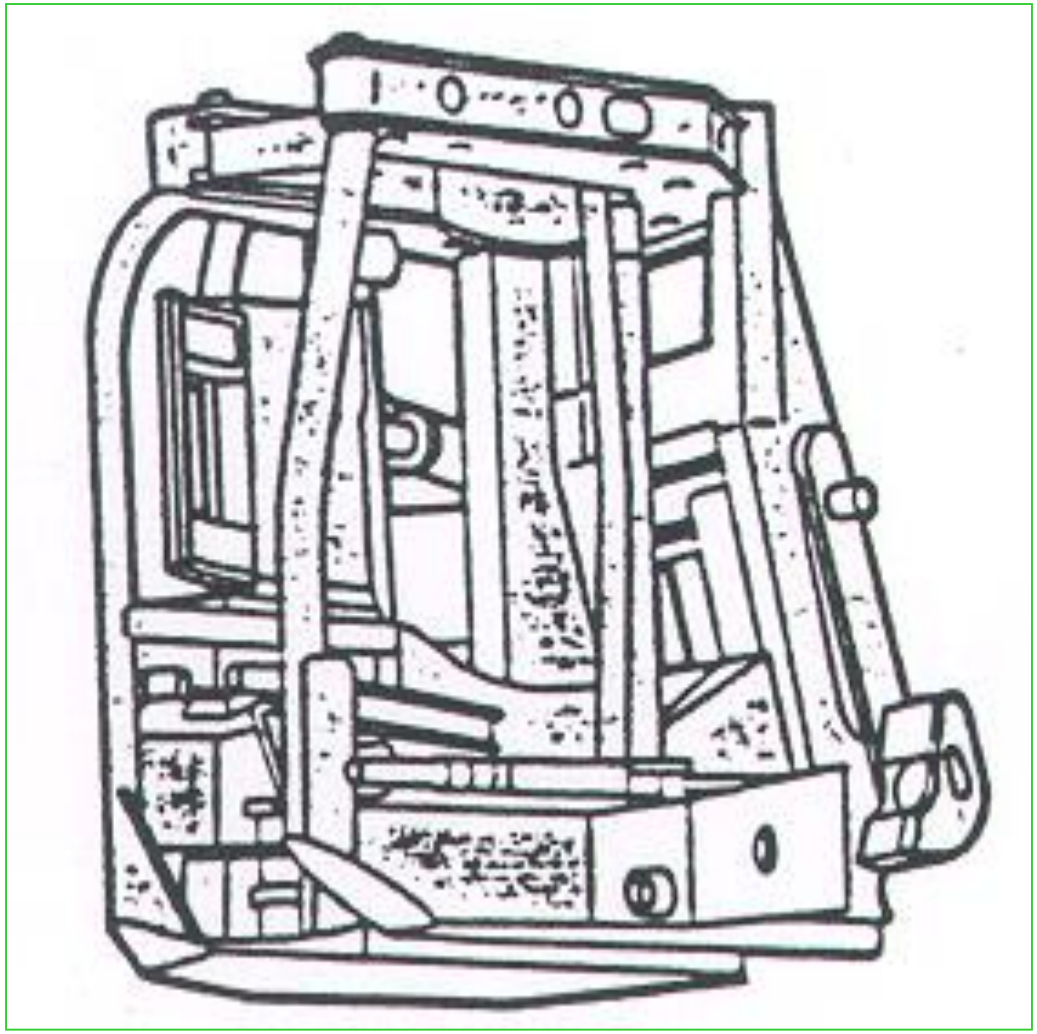
Shear Head

Specialty Head



- Used in highly valuable timber where no butt shatter is acceptable.
- Felling with chain saw.
- A shear blade may be incorporated to cut small trees.

Accumulating Shear

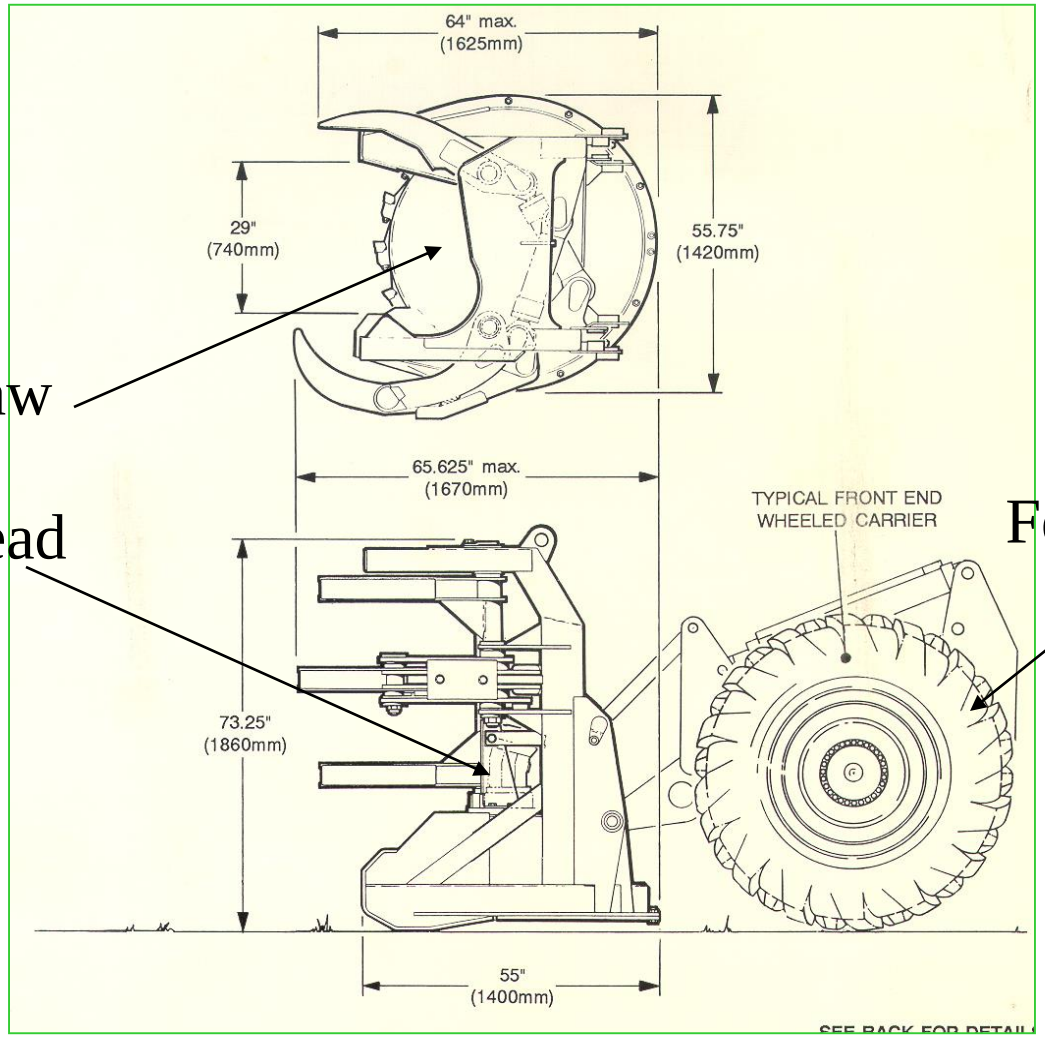


- Can accumulate 2 to 4 trees.
- Works best for smaller-diameter trees in selective harvesting.

Saws

- Chainsaws – driven by hydraulic motor
- Disk saws:
  - Intermittent disk saw – is powered only when the felling head is at a tree to be cut
  - Continuous disk saw – disk rotates continuously and uses the inertia of the large rotating disk to power the saw and to cut trees

Saw Head of Feller-buncher



Disk Saw

Saw Head

Feller-buncher

Disk Saw

Saw Head of Harvester

Saw Head of Harvester

For heavy, hard-to-delimb trees!

For early thinning!

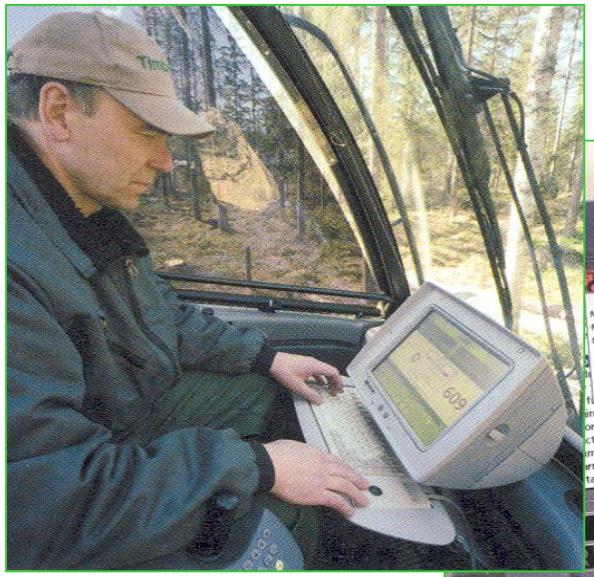
Comparisons
Shears and Sawheads

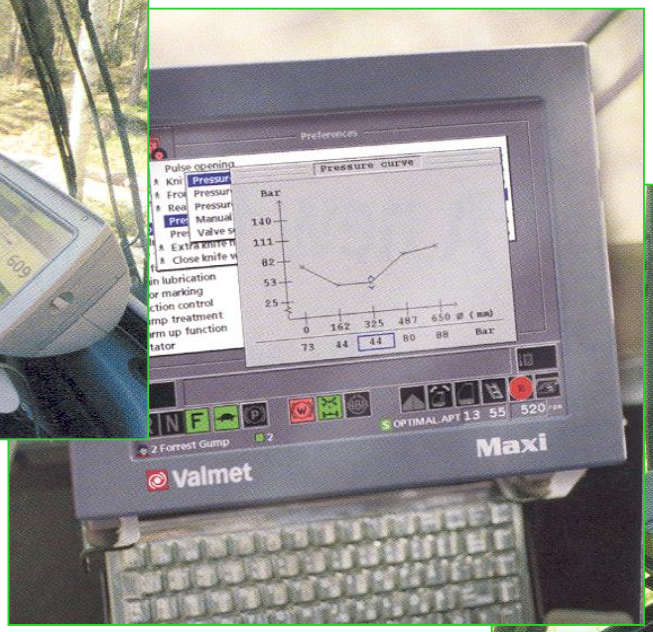
- Shears always cause damages
- Saws can potentially eliminate the damages
- Poor maintenance of either of them increases damages
- Sawheads are up to 40% more productive than shears
- Higher stumps with sawheads
- Sawheads cost more to run than shears

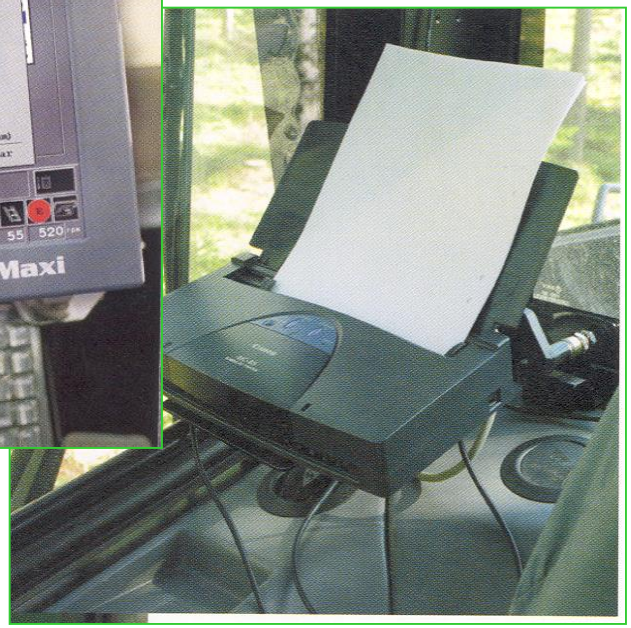
Comparisons
Shears and Sawheads

- Sawheads might be the answer
  - For loggers who are unable to control felling damage with shear maintenance or log trimming
- Shears might be used productively and cost effectively, if:
  - sawtimber was a small part of the total wood harvested, or
  - shear maintenance could reduce felling damages

New Tools of Harvester







GPS

Precision Forestry