



REDUCING DELIMBING COSTS

Conventional delimiting in New Zealand is highly labour intensive and a significant cost element, contributing up to 30% towards total log extraction costs in some operations. The most common method used is the manually applied chainsaw and this operation is both arduous and conducive to accidents.



LIRA PROJECT AND FINDINGS:

During 1977 LIRA carried out a project aimed at examining the possibilities for reducing the costs and high labour involvement in the process of trimming trees.

The project included:

1. *Establishing the significance of conventional trimming in cost and labour consumption.*
2. *Studying the local and overseas developments in mechanised delimiting.*
3. *Investigating the possibility of local mills accepting a lower quality trim standard.*
4. *Considering alternative manual techniques.*

The study concluded that the cost and labour consumption of trimming was significant and could be reduced in the harvesting of smaller trees, such as the stands of Ponderosa and Corsican in clearfelling, and Radiata production thinnings. This is best achieved by mechanisation, however only specific machine concepts offer the potential to reduce costs. Current mills cannot readily accept a lower log trim standard, but suitable processing equipment is available and new mills being planned should consider this as an alternative with possible cost savings. Alternative manual trimming techniques are available which would seem suitable to N.Z. application, however these need to be evaluated with local trials. (*LIRA's full project report titled "Delimiting Studies" P.R.4 1978 is available to LIRA's members on request.*)

MECHANISED DELIMITING:

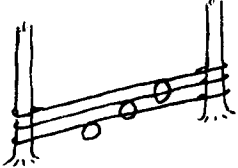
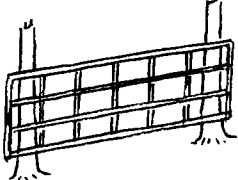
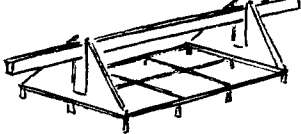
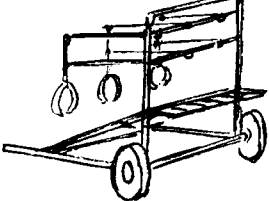
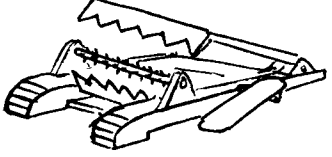
This brief report outlines the form of mechanisation considered to have most potential for reducing the cost and labour of trimming in N.Z. It is hoped that this may stimulate, guide and assist developments most suited to our industry.

The concept with most potential to reduce costs in N.Z. is the multi-stem delimiting device which is an attachment type unit capable of local construction and which is used in conjunction with standard N.Z. logging machinery such as tractors and skidders.

Other concepts of mechanisation, such as single stem delimiters or feller delimiters, may also be capable of reducing costs but are considered to require more favourable circumstances to be successful. In particular, the level of management skill and maintenance back-up must be high.

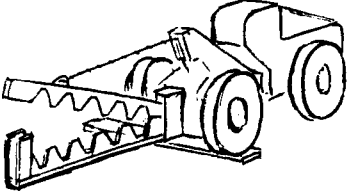
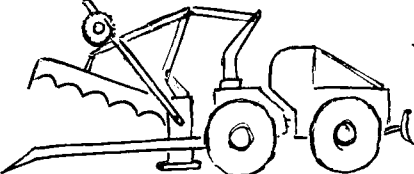
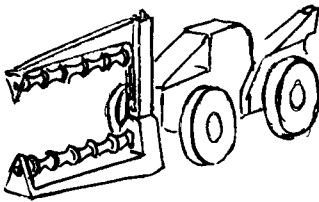
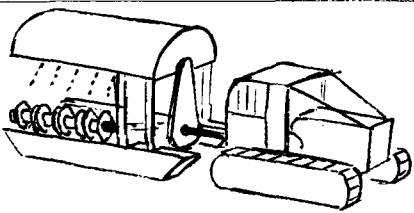
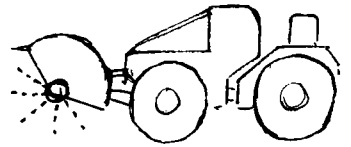
EXAMPLES OF MULTI-STEM DELIMBING DEVICES:

(Controlled by extraction skidder operator.)

DELIMBING DEVICE	OPERATIONAL DETAIL	PERFORMANCE ASPECTS
 <p data-bbox="385 748 620 770"><u>CABLE LOOP</u> (Russia)</p>	<ul style="list-style-type: none"> - Located on extraction skidder track - Cables looped around stems manually - Delimbs the trees being pulled through the loops 	<ul style="list-style-type: none"> - Approx.Cost: \$200 - Low operating cost - High extraction skidder interference - Medium quality delimiting - Slash needs removal
 <p data-bbox="409 1016 581 1039"><u>GATE</u> (U.S.A.)</p>	<ul style="list-style-type: none"> - Located near extraction skidder track - Gate fixed to standing trees - Delimbs the trees pushed back through the gate 	<ul style="list-style-type: none"> - Approx.Cost: \$500 - Low operating cost - Low extraction skidder interference - Medium quality delimiting - Slash needs removal
 <p data-bbox="393 1285 628 1308"><u>GRILLE</u> (Australia)</p>	<ul style="list-style-type: none"> - Located on extraction skidder track - Bar or heavy chain placed manually over trees - Delimbs the trees pulled through under bar 	<ul style="list-style-type: none"> - Approx.Cost: \$750 - Low operating cost - Medium extraction skidder interference - Low quality delimiting - Slash needs removal
 <p data-bbox="385 1554 605 1576"><u>STRIPPER</u> (Norway)</p>	<ul style="list-style-type: none"> - Located on extraction skidder track - Stripping knives lower hydraulically (using own engine) and positioned on trees manually - Delimbs the trees pulled through 	<ul style="list-style-type: none"> - Approx.Cost: \$7,500 - Medium operating cost - High extraction skidder interference - Good quality delimiting - Slash needs removal
 <p data-bbox="393 1850 573 1872"><u>WHALE</u> (Canada)</p>	<ul style="list-style-type: none"> - Located on extraction skidder track - Upper and lower teeth close automatically on stems by movement of stems over spiked roller - Strips branches off stems pulled through 	<ul style="list-style-type: none"> - Approx.Cost: \$10,000 - Medium operating cost - Low extraction skidder interference - Medium quality delimiting - Has automatic slash kicker

EXAMPLES OF MULTI-STEM DELIMBING ATTACHMENTS:

(Controlled by machine and operator separate from extraction skidder.)

DELIMBING DEVICE	OPERATIONAL DETAIL	PERFORMANCE ASPECTS
 <p><u>JAWS</u> (New Zealand)</p>	<ul style="list-style-type: none"> - Located near extraction skidder track - Jaw teeth closed around stems by operating machine - Delimits the trees being pulled through 	<ul style="list-style-type: none"> - Approx. Cost: \$2,500* - Low operating cost* - Low extraction skidder interference - Good quality delimiting - Slash needs removal
 <p><u>MORARD</u> (Canada)</p>	<ul style="list-style-type: none"> - Located near extraction skidder track - Lower arm pushed in under trees, and top toothed arm lowered by machine - Delimits stems pulled through and tops with circular saw 	<ul style="list-style-type: none"> - Approx. Cost: \$15,000* - Medium operating cost* - Low extraction skidder interference - Good quality delimiting - Reposition for slash removal
 <p><u>BOYD</u> (Canada)</p>	<ul style="list-style-type: none"> - Located near extraction skidder track - Top and bottom rotating arm rollers positioned about stems by machine - Delimits the trees pulled through 	<ul style="list-style-type: none"> - Approx. Cost: \$15,000* - Medium operating cost* - Low extraction skidder interference - Good quality delimiting - Reposition for slash removal
 <p><u>STATIONARY FLAIL</u> (New Zealand)</p>	<ul style="list-style-type: none"> - Located near extraction skidder track - Overhead rotating chain flail positioned about stems by machine - Delimits the stems pulled through 	<ul style="list-style-type: none"> - Approx. Cost: \$10,000* - High operating cost* - Low extraction skidder interference - Good quality delimiting - Most slash thrown aside
 <p><u>MOBILE FLAIL</u> (Canada/N.Z.)</p>	<ul style="list-style-type: none"> - Operates on cutover prior to log extraction by skidder - Rotating chain flail is moved along stems by machine - Delimits the trees lying on the ground 	<ul style="list-style-type: none"> - Approx. Cost: \$15,000* - High operating cost* - No interference on extraction skidder - Good quality delimiting - Slash spread on cutover

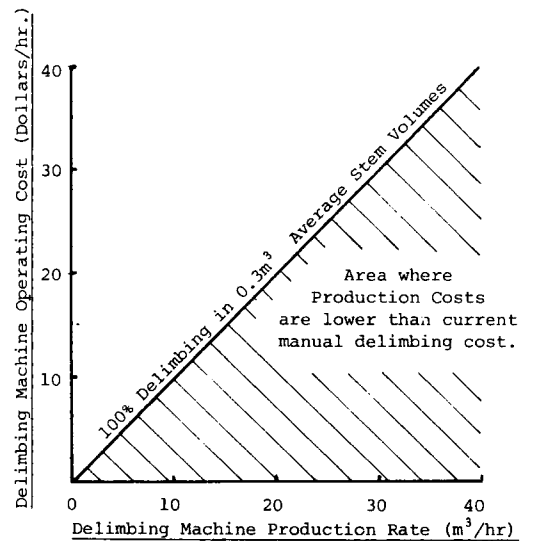
* These costs refer to the attachment only. All require an operating machine and an operator adding to operating cost.

GUIDELINES FOR NEW ZEALAND DEVELOPMENT:

The following general guidelines are provided to assist those interested in supplying or manufacturing delimiting machines or devices along the lines outlined in this report.

1. TREE SIZES: Should be suitable for processing trees of stem volumes up to 0.4m^3 but preferably less than 0.3m^3 . Maximum expected stem diameters would be 50 cm.
2. TREE SPECIES: Should consider application to all N.Z. exotic conifers with a high branch content, particularly Ponderosa, Corsican, Contorta and Radiata thinnings.
3. MACHINE CAPITAL COST: The maximum added capital cost to a system should not exceed \$60,000 and preferably should be much lower than this, in the \$10,000 to \$30,000 range. The potential for any option depends on its estimated operating cost and production rate so each will require individual analysis.
4. MACHINE PRODUCTION RATE AND OPERATING COST: For a range of machine operating costs, the chart opposite indicates the required production rates to keep machine delimiting costs lower than current manual delimiting costs with chainsaw. The extent of machine delimiting achieved must be also accounted for.
5. MACHINE LIFE: This again needs individual analysis with respect to its effect on machine operating costs.
6. DELIMITING QUALITY: Machines can aim for partial trimming only (a minimum of 75%). If so final trimming must be completed by chainsaw so that delimiting quality meets current mill standards.

Apart from the mechanical layout and the manner by which the delimiting device operates, it is also important to consider the total harvesting system organisation into which the unit will fit.



LIRA's basic investigation into delimiting options is now complete, and considerable information has been collected. Many current local developments to mechanise delimiting are considered to be along suitable lines. LIRA is keen to promote or assist delimiting machine developments and would thus welcome notification of any new mechanised delimiting proposals.

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