

# How Are We Going to Log All Our Steeper Slopes?

## - The “Kelly” Harvesting Machine

*Kerry Hill of Trinder Engineers, Richmond, how the “Kelly” Harvesting Machine may provide the step-change required to help New Zealand forestry tackle the growing problem of logging on steep slopes.*

Nelson based logging contractor Nigel Kelly has a pretty simple philosophy about improving productivity: you identify the bottleneck, and then find a solution. The inevitable outcome is that another bottleneck occurs somewhere else in the production line, which means another improvement opportunity has been identified. Most improvements in efficiency and productivity are relatively small, but occasionally a step-change occurs. The Steep Slope Harvester is just such a change.

The task of manually felling trees on steep slopes is physically demanding, and industry records show the highest risk of injury are both manual tree felling and breaking-out. This risk is also increased significantly where wind-thrown trees are present. Manual tree felling also limits hauler productivity because of difficulties in pre-bunching trees - necessary to maximise pay-loads for the cable yarder. Nigel currently has a harvesting machine felling trees on slopes up to 45 degrees in both clear-fell and windthrow operations, and is well on his way to having an industry solution for the above problems on steep terrain.

The base excavator is a Hitachi ZX 280 high and wide chassis configuration with track frames lengthened. A 4 tonne winch was mounted to the rear of the machine with 300 metres of wire rope which runs through a fairlead at the front of the machine. Trinder Engineers of Richmond Nelson designed and managed all engineering works. The first prototype machine has been tested in a variety of site and slope conditions for 12 months, during which time it has completed over 2500 hours. Most work has been carried out in Nelson Forests Limited estate, according to a strict set of operational and safety procedures prepared by Kelly and confirmed with Nelson Forests Limited. Draft best practice guidelines have been distributed to forest owners and DOL for further comment. The objective is to have the guidelines incorporated in the Review of the ACOP (Approved Codes of Practice) and BPGs (Best Practice Guidelines) for Forestry which is currently underway.

The prototype harvesting machine has demonstrated to Nigel that his concept is economically viable. Mechanised felling is occurring on slopes up to 45 degrees. Stems

are felled and presented in bunches for cable extraction without involving manual pre-fallers or breaker-outs on these slopes. Hauler productivity has increased by more than 20% in most felling coupes. An additional advantage in some difficult-to-access sites is the ability to shovel the logs downhill for the skidder to transfer to the log processing area.

A misconception in earlier reports was that the harvesting machine “swung” off the end of a wire cable. This is not correct. While the harvesting machine is in fact secured to a back anchor, the purpose of the cable is predominantly to assist with traction as required when the harvesting machine is travelling uphill. Furthermore the maximum line pull permitted has been limited to 15 tonnes.

Earlier this year Nigel travelled to North America and purchased a John Deere 959J self-levelling harvester. The John Deere has been felling in the Nelson and Marlborough forests, on slopes up to 26 degrees. The purpose of these trials was to see whether it was suitable for a winch attachment. As a result of these trials Nigel Kelly and Trinder Engineers have now designed the third prototype, which will be a demonstration model. Construction of the demonstrator is conditional on funding assistance, but by late 2011 the Demonstrator should be available for trials outside of the Nelson Region. An additional feature of the Demonstrator will be the incorporation of a blade in the base machine as the safety braking device.

The steep slope harvester is an integral part of the work programme identified by Future Forests Research. Kelly Logging and Trinder Engineering are working closely with the Harvesting Theme leader Keith Raymond on funding the development of the Demonstrator, and undertaking a work study on the John Deere and comparative studies between the two base machines.

Costing and productivity studies indicate that improved harvesting costs (up to and including loaded on truck) can be achieved over a broad range of hauling and log processing configurations.