ISSN 0111-6711

LOGGING INDUSTRY RESEARCH ASSOCIATION
NEW ZEALAND

REPORT

Vol.6 No.6 1981

LOG PREPARATION FOR HELICOPTER EXTRACTION

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INTRODUCTION

The often exciting concept of using helicopters for log extraction, and their very high hourly productivity, tends to obscure the high costs of the less glamorous aspect - timber preparation. A good understanding of the factors and costs involved in such preparation is essential to the success of helicopter operations. This report describes log preparation activities at two extremes of log size.

The single most important factor controlling the operation is the lifting capacity of the helciopter. Other important factors are topography and stand characteristics. Of the helicopters currently available in New Zealand, the Lama is most suited to logging. It has a lift capacity of 1000 kg. The cost of operating such a machine is extremely high ($600 / hour), so it is important to keep utilisation as high as possible. This can only be achieved by well planned and supervised timber preparation.

LIRA used two very different trials to illustrate key points in this report. The first example (A) involved timber too large for the helicopter to handle, and so had to be broken down into logs or planks. In the second example (B) posts from very small trees were cut, and these had to be stacked into bundles to achieve maximum utilisation.

OPERATION CHARACTERISTICS

Environmental factors in both cases necessitated the use of a helicopter. In Example A, native timber had to be selectively logged with minimal damage to the residual stand. In Example B, a block of radiata pine in a water catchment area for a major city, required thinning. 400 tonnes of timber were to be extracted from each operation. Steep topography was a common factor. Both examples used the same sized machine with the same hourly cost.

EXAMPLE A

This involved selection logging of kauri.

Constraints

The area concerned was under intensive management and extreme care was needed not to damage the residual stand, which comprised of trees from seedling size to mature kauri. Access was difficult. It took up to 45 minutes to walk uphill into the logging area. The trees were often widely scattered within the stands which meant that the fallers took some time to get to the next tree. Each log had to be individually scaled because volume tables were not reliable enough to calculate the log weight accurately.

Alaskin mill cut large logs into planks

Equipment & Manpower

As the logs needed to be broken down before extraction, a lot of equipment was required - all of which had to be carried into the area on foot.

Chainsaws were used for felling, trimming, cross-cutting, and for operating an Alaskan chainsaw mill. Assorted sundry equipment, such as timberjacks, crowbars, axes, wedges, chainsaw fuel, etc. was also required.

Two methods were tried for breaking-down logs larger than 1000 kg. One method was to quarter the logs using a chainsaw and long bar. However, it was considered that quartering down-graded the logs, and it was necessary to achieve as high a value as possible in this type of operation.

The second method was therefore considered better. This was an Alaskan mill, which was a framework holding a chainsaw used to rip large logs into planks. The tree was felled directly up and down the slope and a ladder placed on top of the log. A frame with a chainsaw attached ran along the ladder to enable an even cut to be made. The cut, or rip, was run for the length of the ladder. If the cut needed to be longer than the ladder, the whole setting-up procedure was repeated. This operation was extremely time consuming requiring a lot of skill and patience.

Setting up the Alaskan mill required three people. A further two people were required to fell, trim, and cross-cut, working with two others to scale and mark the logs to required sizes.

EXAMPLE B

This involved felling, trimming, cutting to length, and stacking, radiata pine posts.

Constraints

The stand was age 11 and was being thinned from 1600 sph to 350 sph. Situated at the head of a major city water catchment area, the stand had four-wheel-drive access tracks only. Because of expense and the sensitivity of the area, roading was not desirable. The country was too steep to work a skidder system, and there were no hauler systems or expertise in the area.

Important factors affecting post extraction with helicopters were:

1. Stacks had to be kept to the specific size depending on the number of posts per tonne.

2. Stacks had to be made compactly off the ground to ensure easy stropping.

3. To give breaker-outs a clear exit during extraction, tracks had to be cleared in an uphill direction.

4. Reject posts could not be placed in stacks. The operation was too cost sensitive to fly out non-saleable pieces.

Equipment and Manpower

Manpower needs depended on how quickly the posts needed to be ready. For this example it was assumed that four cutters were needed. The only equipment required was one chainsaw per cutter, and some means for measuring the posts.

Bundles of posts ready for extraction by helicopter

DISCUSSION

From these two examples, the time involved in the preparation for a helicopter logging operation becomes apparent. In a selection logging exercise, 67 man-days would be required to fell, trim, measure, and cross-cut 250 trees. Assuming that 10% of the trees felled had to be ripped, it would take approximately 140 man-days to prepare 400 tonnes. For post extraction, one man would be expected to cut approximately 200 posts per day. Assuming there are 27 posts per tonne, 10,800 posts would be required for a total of 400 tones. It would take four men 54 man-days to accumlate this.

Helicopters would normally only be considered in areas which are topographically hostile or have access constraints. Problems confronting fallers will be magnified under these circumstances. The faller must be able to get down hangups using whatever aids he has available. Cost/payload sensitivity means that the faller must understand the affect an overweight load has on individual cycle times. Also, he must be aware of the affect of such things as leaving branches or the crown of the tree attached. Working on such topography greatly increases the danger, so safety under such circumstances, especially in isolated areas, must be of paramount importance in the initial planning stages.

It is interesting to note that productivity of post cutters under a helicopter extraction system was higher than under a conventional system on the same terrain. This was because of the reduced bundle size from approximately 60 posts to only 27.

CONCLUSIONS

Helicopter operations are known to be expensive, but the cost of preparation could conceivably be as high as the cost of extraction. To keep these marginal operations in a profitable phase, the pre-extraction preparation must be well planned and supervised. The length of time required for preparation has been well illustrated - to extract 400 tones of prepared material would take approximately 25 - 30 flying hours.

It is vital to the success of helicopter operations that the preparatory work is done before the helicopter arrives. The principles involved in both preparation and extraction of timber needs to be well understood before a helicopter operation is contemplated.

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