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Using a Helicopter to Pull Strawline

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Figure 1 - Robinson R22 Beta II Helicopter

Background

Rigging cable logging systems often involves the use of lightweight strawline. This is generally pulled by hand, either directly off the hauler drum, or from coiled lengths carried to high points in the setting. Hand-pulling strawline is seen as a necessary evil as, while it must be done, it represents downtime where the hauler is idle, and most of the crew will usually be required to help.

Pulling strawline by hand means the rope is laid out along the ground and this can lead to several problems:

- more strawline is used as it is laid at ground level
- it is difficult to maintain a straight line when pulling strawline; binds in the rope are common and can lead to kinks and/or breaks in the rope during inhaul
- strawline will then be pulled up through or against any obstacles (including standing bush) during inhaul, often causing damage to the rope
- strawline joins can come undone through negligible (hand) tension, and contact with ground and other obstacles.

Helicopters were first used to pull strawline in New Zealand in the early 1980s but, largely due to cost, they have since been used only for the most difficult rigging tasks (John Gaskin pers. comm.). However, two Timberlands West Coast Limited contractors make regular use of a small helicopter to pull strawline, ferry and retrieve equipment, and assist with other rigging tasks.

This Technical Note revisits the concept of using a helicopter to help reduce rigging delays through a brief case study.

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Operation and Results

The setting topography comprised short steep slopes in excess of 70° (Figure 2), and was to be logged downhill using the Highlead system. There was no machine access to the backline and blocks were to be hung on stumps.

Figure 2 - Cable setting overview

The hauler was a Thunderbird TTY45, running 16mm tailrope and 10mm strawline. Five members of the crew assisted with the rigging, with the hauler operator and skiddy at the hauler, and three men setting up blocks on the hill. The rest of the crew remained processing on the landing.

The helicopter was a Robinson R22 Beta II model, with a 4.6 m strop and single cargo hook on a quick release connection. Both the tailrope and strawline were pulled by the helicopter, with the technique being:

- lift the rope up as far as possible, or as far as is necessary (as height increases, a 'belly' forms in the rope which helps to pull more slack off the drum)
- lay the slack around the setting for the bushmen to place in the corner and tail blocks.

The helicopter arrived just as the rigging crew had finished setting the hauler up on a new extraction pad. A breakdown of the rigging operation is summarised in Table 1.

Costs

The Robinson helicopter costs approximately $350/hour with travel time to the site charged one way. This whole rigging operation took approximately 36 minutes, with helicopter on-site for 26 minutes. According to the contractor, the equivalent manual operation would have taken the crew approximately three hours. Based on these times, the estimated rigging costs for the two operations are presented in Table 2 (gang costs based on Riddle, 1994)

Table 2 - Cost comparison

Method	Time (min)	Total Cost (inc. crew time)	Difference
Helicopter	36	$484	
Manual	180	$1,494	$1,010

Table 1 - Summary of helicopter operation timing and events

Time	Event
8.57 am	Chopper took off to fly setting with foreman, to finalise block location and retrieve blocks from previous adjacent setting.
9.03 am	Setting flown, foreman in place at block stump, and chopper back at landing to pick up second rigger.
9.05 am	Second rigger in place and chopper back at landing to pick up third rigger and spare block.
9.08 am	Third rigger and block in place, and chopper back at landing to pick up the tailrope.
9.15 am	Tailrope pulled off hauler drum and laid out half way around the setting (in the block(s)), and chopper back at landing to pick up strawline.
9.22 am	Strawline pulled off hauler drum and laid out around the setting (in the block(s)) to join up with the tailrope, and chopper back at landing.
9.24 am	Strawline connected to the tailrope and strawline winding in. Chopper left when the tailrope had been successfully wound in to the landing.
9.33 am	Tailrope and strops connected to butt rigging, ready for first drag.

Discussion

The pilot has been rigging cable systems for more than two years. He emphasised that clear radio communication between the hauler operator and the pilot is crucial, as is a thorough understanding of the operation by all personnel involved. The hauler operator must watch the winch-drum closely, keep the pilot regularly informed, and only lightly feather the drum brake when necessary to avoid over-runs.

The distance that the helicopter can pull rope depends on the size of the rope and the nature of the setting. The ideal setting has the tailhold position well below that of the hauler. In this case, gravity will work on the 'belly' that forms in the rope, helping the helicopter to pull more rope off the hauler drum. The heavier tailrope is only pulled directly off the drum for very short (<100m) distances.

In this highlead situation, the only way to get strawline around the setting would have been to carry some coils up to the backline and then run them back down hill to the hauler. This would have been slow and made more hazardous by the vigorous native regrowth through the stand, and the steep slopes within the setting. In other West Coast settings, there are often steep gorges and/or bluffs that mean packing equipment in by hand is not the preferred option.

The helicopter is also used to set up skyline spans of up to 600m. The helicopter will pull strawline from the hauler to the corner block and along the backline to where the skyline anchor will be. The helicopter will then return to the hauler, attach strawline and pull that out to meet the first length, so the tailrope is then pulled around by the strawline. The skyline and strawline are then connected to the tailrope which pulls these ropes back out to the tailhold. Once the skyline is anchored, the strawline pulls the tailrope back to the hauler and it is connected to the butt rigging / carriage.

If the tailrope is to be spread out both sides of the skyline (for example, when bridling) the helicopter can be pulling another length of strawline out to the other side of the skyline while the tailrope is pulling the skyline out to the tailhold. This second length of strawline can be used to pick up the tailrope once the skyline is in place, so the hauler can pull the tailrope along and back to the landing.

It is important that the rigging crew be organised to utilise the helicopter's time efficiently. For example, some short spans of highly variable backline terrain may be better run by hand while the helicopter lays out the straightforward areas. Light payload capacity and high speed mean it is faster and safer to do extra trips with rigging, than to try and maximise the load each time.

There are two situations to be aware of when pulling strawline with a helicopter. The first is that there is potential for the connections to get tangled in scrub. This may hinder the helicopter or undo the connections. The second is that binds may develop, where the strawline is routed over an object rather than the more direct line underneath. However, the opposite may occur when pulling strawline manually.

The two Timberlands West Coast Limited contractors are enthusiastic about the helicopter as it offers:

- fast, consistent setup time
- a relatively inexpensive option (compared to the downtime)
- less physical demand on the crew
- does not require the whole crew
- morale boosting (fast setup time, helicopter ride)
- can better optimise anchor positions.

References

Riddle, A. C. (1994): "Business Management for Logging". Logging Industry Research Organisation.

The gang-day costs stated were derived using the procedure shown in the Liro Business Management for Logging Handbook. They are indicative only, and do not necessarily represent actual costs for this operation.