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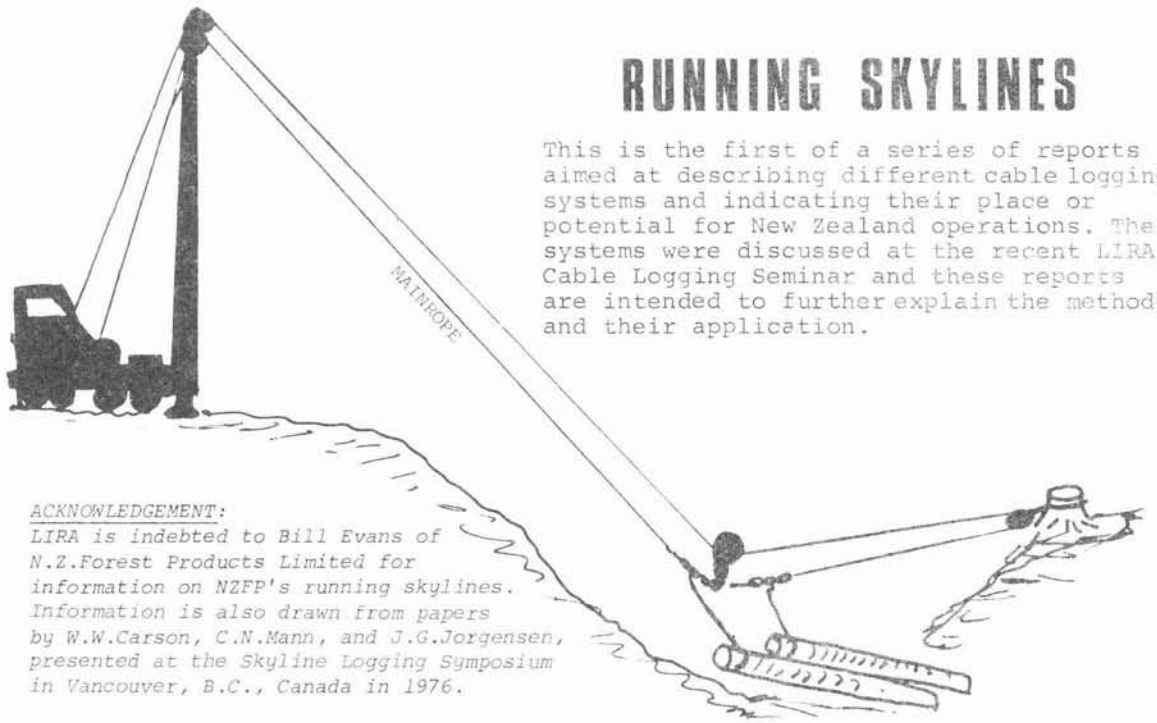


RUNNING SKYLINES

This is the first of a series of reports aimed at describing different cable logging systems and indicating their place or potential for New Zealand operations. The systems were discussed at the recent LIRA Cable Logging Seminar and these reports are intended to further explain the methods and their application.

ACKNOWLEDGEMENT:
LIRA is indebted to Bill Evans of N.Z.Forest Products Limited for information on NZFP's running skylines. Information is also drawn from papers by W.W.Carson, C.N.Mann, and J.G.Jorgensen, presented at the Skyline Logging Symposium in Vancouver, B.C., Canada in 1976.

Two cable systems commonly used in New Zealand are highlead and skyline. The survey of cable hauling done by LIRA in 1977 indicated 53% of operators used highlead and 37% used skylines; only 10% at this time used running skylines.

The advantage of highlead is its simplicity in rigging and the fact that it can be used with a wide variety of haulers. It functions by positioning a lead block high on a spar to give main rope clearance over obstacles. Clearance, and thus ease of hauling, may be limited by height of the spar, the nature of the landing, slope or ground profile. Given the large landings prevalent in N.Z. for tree length log processing, clearance is not achieved with many uphill hauls.

The advantage of a skyline is that more 'lift' and thus easier hauling is possible, but skyline systems using either fixed or live skylines are more difficult to rig and it takes longer to carry out line changes. For live skyline systems a more expensive three-drum hauler is required. Many of these systems can extract large loads over long distances but they are expensive and most have limited mobility.

More recently, to combine the advantages of both systems, running skyline systems (also known as scab skyline or Grabinski systems) have been used for both choker and grapple operations primarily with large mobile high-powered steel-tower haulers that have sufficient braking capacity to operate the system.

The running skyline system combines the function of tailrope and skyline in one rope. It is rigged by leading the tailrope through a block which is attached to the butt rigging. The load travels to the landing supported by the block on the tailrope and tension maintained in this rope imparts additional lift to the load. The system has the ability to reach longer distances and gives better clearance and lift over a wider range of terrain than highlead. It has improved mobility over traditional skyline systems and is easier to rig and operate. With appropriately designed three-drum haulers, grapple operation and slack-pulling ability for partial logging or thinning is possible with a running skyline.

A prime requirement for an efficient running skyline system is therefore very good control of the tailrope tension. This is achieved through an effective braking system or an interlock mechanism which regulates the speed difference between main and tailrope drums.

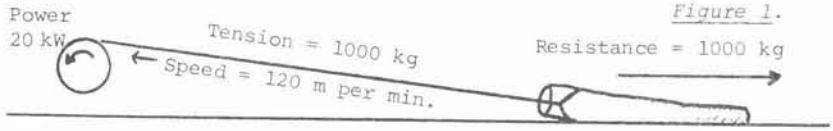
THE MECHANISM OF THE RUNNING SKYLINE SYSTEM:

Basically, the running skyline gains its lift and controls its deflection by controlling tension in the tailrope. To overcome this tailrope tensioning pull, considerable maindrum power is required to move the rigging and the load toward the landing unless a device for interlocking inhaul and outhaul drum movements or transferring power between them is incorporated in the machine.

Let's examine the requirements step by step. (The friction losses and variations in ground resistance in the system will be disregarded in these examples.)

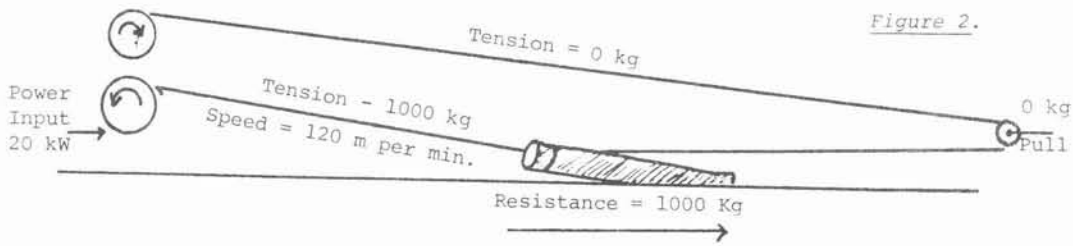
In the simplest hauling situation, given a load resistance of 1 tonne and an inhaul speed of 120 m per minute, the power required is approximately 20 kW *(Fig.1)*.

Figure 1.



If we add a tailrope and assume no load or tension from this, the same situation applies. There is also no load on the tailhold block *(Fig.2)*.

Figure 2.



If we now try to lift the load by tensioning the main and tailrope at the same time, the power requirement increases dramatically. *(Fig.3)* (Actual power required of course varies with deflection.) The power required for braking on the tailrope drum is dissipated through heat, and a greatly increased tailholding load eventuates.

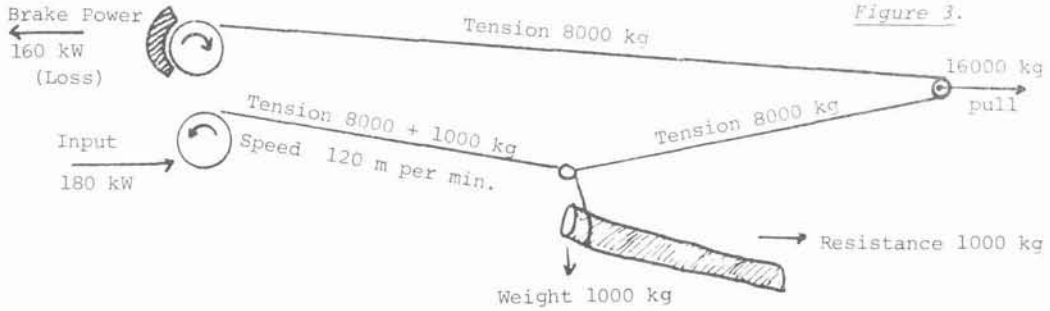


Figure 3.

However, if we rig as a running skyline two sets of rope are lifting and the power requirement is consequently reduced. The pull on the tailhold is halved *(Fig.4)*.

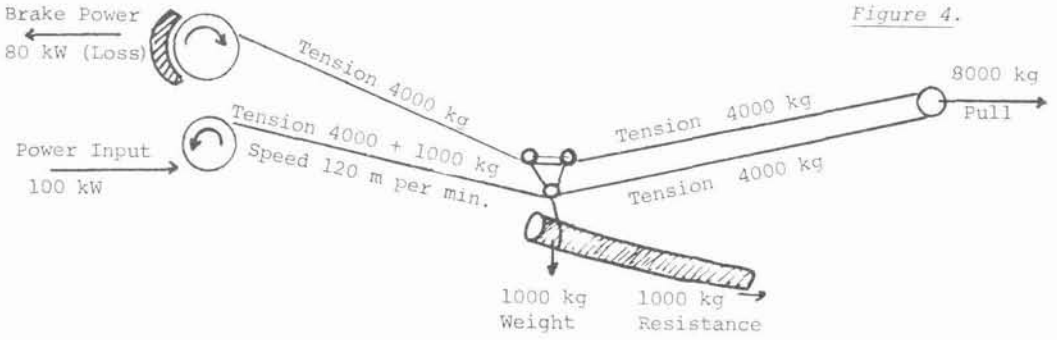


Figure 4.

NOTE: The above figures apply to a brake controlled system; with an interlock system the power input requirements are even lower.

SHOULD YOU USE HIGHLEAD OR RUNNING SKYLINE?

The running skyline system has been used in N.Z. with Madill 009 haulers, particularly by contractor Pat O'Sullivan and by N.Z.Forest Products Limited gangs. Both operators change from highlead to running skyline depending on the conditions encountered.

The highlead system is the simplest. It is easiest to rig and use with any two-drum hauler and should be used in most situations where good clearance can be maintained particularly on unbroken concave profile slopes. Line shifting is simpler and quicker, and rope wear is less.

The running skyline system gives distinct advantages where improved lift and/or close control of logs is required, e.g.:

- Where marginal clearance may create problems by logs fouling stumps or digging into the soil.
- Where obstructions such as rock outcrops or rock faces have to be overcome.
- Where fallen logs have slid downhill to become embedded and good lift is necessary to break them out.

The system virtually eliminates slack in the tailrope which prevents over-running when hauling downhill. This control is also an advantage when positioning the butt-rigging to break-out, and when setting the logs down on the landing. Further advantages are:

- The tailrope braking effort is reduced to about half the requirement of that for standard highlead when hauling steep downhill settings.
- Much of the shock load associated with highlead is avoided.
- There is no tailrope bight to contend with and thus the breaker-out can retire to either side of the haul path.
- On the landing area the tailrope leads from the fairlead along the same line as the mainrope, thus the danger area under the lines is reduced.

There are some disadvantages:

- Tailrope wear is confined to a lesser length of the rope with resultant higher wear rate for that section. This can be off-set to some extent by end-for-ending the tailrope before too much deterioration occurs in the working section.
- Due to their close proximity, operating ropes can become entangled and additional abrasion can occur. This can be reduced to some extent by using two tail-hold blocks spaced three or four metres apart. *(See Figure 5.)*

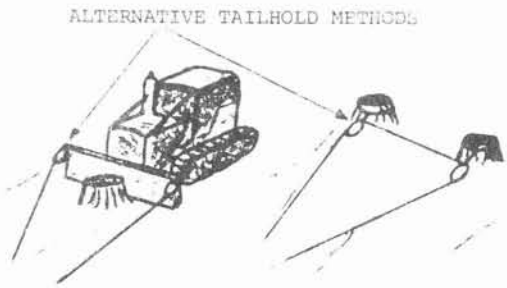


Figure 5.

- More frequent haul line changes are necessary and require strawline each time - approximately 20-25 minutes per change compared to highlead's 5-10 minutes.
- Heavy duty water-cooled brakes, interlock or regenerative gear systems are necessary to provide continuous braking.

TO SUMMARISE:

The running skyline system has application in New Zealand primarily as an alternative to highlead where there is a need for better lift and/or closer control than is possible with the simpler system. To give the performance required, an adequate braking system or an interlock device is required. Some heavier rope wear may be experienced.

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