LOADING FOR A CABLE-LOGGING OPERATION

(A Report by Glen Murphy, Forest Research Institute)

LIRA has a current project aimed at establishing criteria for the selection and application of log loaders. This report by Glen Murphy, F.R.I., outlines some of the key factors to consider in the application of a rubber-tyred front-end log loader to a cable-logging operation.

In early 1977 the FRI Harvesting Research Group carried out a study on a high producing cable-logging operation in which a Madill 009 hauler was used. The opportunity was also used to gather some basic information on the front-end loader working with the Madill. This report summarises the findings on distribution of time for the loader, cost of the loading phase, and areas where future research work is required.

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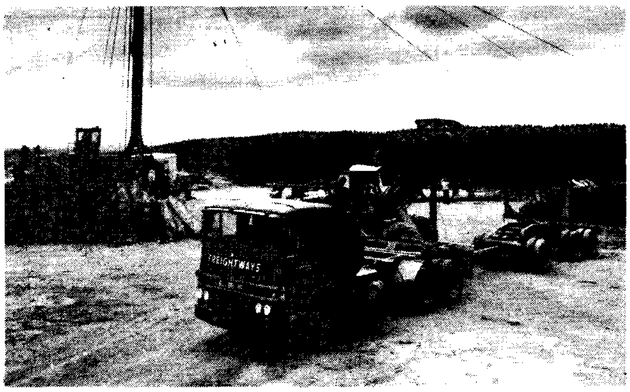
THE METHOD:



F.R.I. Photo

Fig.1 - Loading truck on hauler landing.

The cable-logging operation landed tree lengths in front of a Madill spar where they were trimmed and cut-to-length, with chainsaw, by three skiddies. The loader studied, a Fiat-Allis 645-B rubber-tyred front-end log loader, was used to clear the prepared logs from the hauler, sort and stack the required log assortments, and load out logs onto trucks as they arrived. The sorting, stacking, and loading operations were carried out clear of the hauler operation but on the same landing.

THE OPERATING CONDITIONS:

The loader operator had had 20 years' experience in forest and mill operations and one year as a loader operator for the cable-logging gang. He was also the owner of the front-end loader.

The study covered a period of three months in the relatively dry conditions of summer. During this time the loader worked on two landings (Table 1), and seven product assortments were stacked and loaded.

LANDING	MEAN TREE VOL.	LANDING SIZE	NUMBER AND TYPE OF ASSORTMENTS	
A	4.5 m^3	0.25 ha.	Domestic sawlogs	9.9 m 11.1 m Random Length
			Peeler Logs	1.8 m minimum
B	4.5 m^3	0.45 ha.	Export sawlogs	11.9 m 8.0 m
			Pulpwood	3.6 m minimum

Table 1 - Operating Conditions

The loader operator was usually on-site by about 4.30 a.m. to load out "export" trucks so that they could get an early start for the 320-km round trip to the port at Mount Maunganui. He usually finished work at 3.15 p.m., the same time as the rest of the gang.

DISTRIBUTION OF LOADER'S TIME:

In this study it was found that the loader had high mechanical availability (93%) but low productive utilisation (50%). Table 2 shows a breakdown of the time spent on each element of productive and unproductive activity.

ELEMENT	Before 6 a.m. (hr.)	After 6 a.m. (hr.)	Proportion of Total Time
Productive			
Stacking	0	107.7	20.0 %
Loading	40.0	78.0	21.9 %
Clearing landing	0	40.5	7.5 %
Assisting skiddies	0	3.5	0.6 %
Assisting hauler	0	0.6	0.1 %
Subtotal	40.0	230.3	50.1 %
Unproductive			
Refuelling	3.6	6.2	1.8 %
Repairs and Maintenance	7.2	32.6	7.4 %
Unavoidable delays	0	0.7	0.1 %
Other	0	24.5	4.5 %
Waiting for work	0	101.2	18.8 %
Machine idle	29.1	63.6	17.2 %
Subtotal	39.9	228.8	49.9 %
TOTAL:	79.9	459.1	100.0 %

Table 2 - Distribution of Time by Work Elements for a 3-month Assessment Period

For about half the time the loader was on-site it was doing productive work such as sorting and stacking, loading, and clearing the landing of rubbish.

A third of the time spent loading trucks was before 6 a.m. when it was necessary to use lights mounted on the loader. The loader activity included the off-loading of trailers from trucks.

A significant portion of the productive time was used in keeping the landing clear of rubbish, most of which was in the form of slovens and trimmed ends. Because the stand had been unthinned and stem breakage had occurred near the "branchy" head, very few trees arriving at the landing had many branches. In stands where piece size is smaller and the trees more branchy such as could be found in tended short rotation stands, one could expect that keeping the landing clear would take up even more time.

The other half of the on-site time was spent on unproductive activities. A large part of this time was spent either waiting for work*[1] (i.e. trucks to load, or logs to sort and stack) or idle during rest breaks (e.g. during "smoko", or early in the morning before the rest of the gang arrived). It could be expected that there would be less waiting for work where gang production is higher (e.g. for a cable-logging operation where haul distances are short) or where finished log size is small and the number of pieces to be handled high. The author would like to emphasise that the large proportion of unproductive time is <u>not</u> caused by inefficiencies in the loading operation. It is, rather, an inherent characteristic of the logging system being used. The need for the loader-operator to be on-site well before the rest of the gang arrived to load out "export" trucks caused a large proportion of the idle time. It is also apparent that the hauling phase limited the overall system and that the loader could handle some increase in system production if achieved by the hauler.

F.R.I. Photo

Possible improvements in equipment utilisation and system production rate could be obtained if the loader was used to pull logs aside from underneath the hauler spar. This would reduce skidwork interruptions to the hauling phase thereby increasing hauler production and, correspondingly, loader utilisation and production. The ability of the loader to perform this task would however need evaluation.

← *Fig.2 - Fiat-Allis 645-B front-end log loader.*

During the study period the loader loaded out a total of 442 trucks with an average load of 26.2 tonnes (25.4 m^3). The average time to load a truck was 16.02 minutes. The average number of trucks loaded per day was 8.6, ranging from a high of 15 to a low of 6.

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*[1] *NOTE: "Wait for work" also includes some interference time between the skidwork and loading phases. Although logs were on the landing the loader, for safety reasons, had to wait until the skidworkers had finished processing the logs.*

THE COST*[1] OF THE LOADING OPERATION:

For the cable-logging operation studied, over 18% of the costs were related to the loading phase (Fig.3) One-fifth of the loading cost was manpower-related, and four-fifths was machinery-related. A cost of $\$0.92/m^3$ was calculated for this loading operation.

The proportional cost of the loading phase will vary for different logging operations. For example, in many tractor-logging operations on flat country, where the capital cost of extraction units is lower than for haulers on steep country, the loading phase could cost more than 18% of the total.

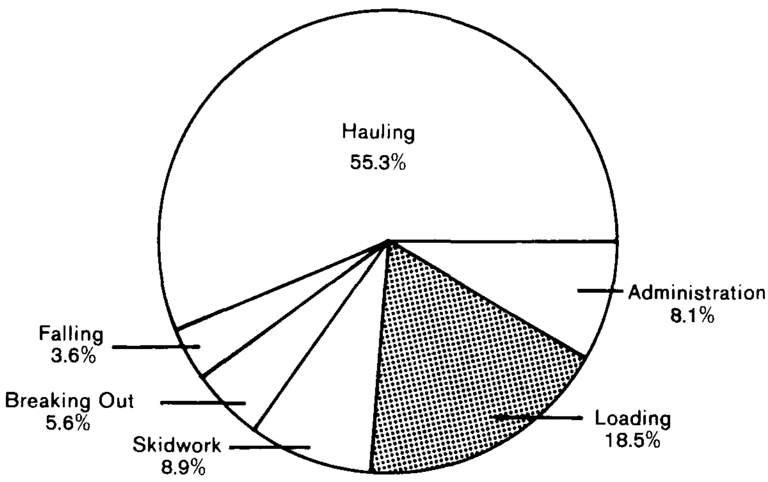

Fig.3: Cost-distribution for a cable-logging operation

CONCLUSIONS:

Loading occupied a significant portion of the total daily logging costs for the system studied.

Although the loader had high mechanical availability it was only utilised for half the time it was on-site. The low utilisation was due to the early morning "export" trucking requirements, and to the limited hauler production, i.e., the loader had surplus capacity for the system it was working under.

Improved production from both the hauler and loader could be expected by altering the method of utilising the loader. However the ability of this type of machine to pull logs from in front of a hauler as suggested needs evaluation.

The loading phase of any operation is seen as being very variable. Many factors such as number of assortments, piece size, tree branchiness, truck scheduling, landing conditions, will effect the levels of utilisation, production, and unit costs achieved.

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*1 *The costs used in this report have been drawn from industry-wide sources and applied to a uniform cost construction format to provide a basic standard current (mid-1977) cost assessment.*

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