FUTURE FORESTS RESEARCH

HARVESTING TECHNICAL NOTE

Vol: 2 Number: 4
2009

A Method to Estimate Yarding Distance

Summary

The measurement of the length of main line out to estimate cable yarding distance is important for cable logging productivity for several reasons: 1) enabling the rapid return of the rigging to the breaker outs; 2) measuring extraction efficiency; and 3) providing contractors with information for planning performance of future logging jobs. Methods used to estimate yarding distance are discussed and some improvements suggested.

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Introduction

As part of FFR's harvesting research programme "Real Time Productivity Data Collection" methods to measure or estimate yarding distance were investigated.

There are several reasons for measurement of yarding distance or the length of rope unwound from the main rope drum.

The main purpose of this measurement is to improve the rapid return of rigging or carriage to the previous breakout point, reducing the outhaul element of the cable logging cycle, thus improving productivity. It can also be used to provide a reference point for any obstacle during the inhaul phase of the haul cycle.

A yarder has been developed in Austria that uses yarding distance measurements, via a sensor, to yard more efficiently. The Synchrofalke truck-mounted yarder/processor system, developed by MM Forsttechnik, has a computerised carriage control system capable of automatically moving the carriage back to previous break-out point.

Skyline drum rotation measurement can also aid an operator in returning a lowered skyline to its previous position.

Measurement and recording of yarding distance and time also has the potential to improve extraction efficiency (through monitoring of distance and time for inhaul and outhaul, possibly with the use of a data logger such as MultiDAT (Evanson, 2009).

A further benefit to measurement of average haul distance is in shift-level record keeping to enable comparison of previous performance (such as average cycle time, haul size, daily production etc) to provide production estimates of future harvest areas. One method involves a range of haul distances being recorded manually on paper, and average distances calculated.

In New Zealand, two yarding contractors have adapted Kortz cable counting technology originally developed for the fishing industry for use with yarders (Figure 1).

Figure 1. A cable counter display

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Method

Information was sought from two contractors with experience in using cable counting systems and one supplier of cable counting equipment.

Results

Kortz cable counting equipment originally supplied by Kernohan Engineering Ltd of Nelson some years ago was observed on a recent visit to two yarders, a Madill 172 and a Madill 122, owned by a logging contractor.

Magnets were fitted to both main rope and skyline drums and rotations were monitored via a sensor (Figure 2) and displayed in the yarder cab. Both forward and reverse drum movement is capable of being displayed.

The cable counting equipment was not working at the time because of the loss of some of the magnets that had been fixed to both drums.

Figure 2. Magnet sensor positions on a drum - drive

The yarder operators described how the equipment was used, namely for returning the rigging or carriage to the break-out site, and for raising the skyline to its previous position.

The skyline cable counter allows a lowered skyline to be returned close to its previous tension position.

Subsequently, a supplier of the cable or chain counting equipment was contacted. CruzPro Ltd is a New Zealand company that develops and manufactures specialized electronic products. They supply a low-cost counter display (CH55 model) for about $250 which includes 1 niobium magnet and 2 sensors. Two sensors, placed so they touch each other are necessary to record forward and reverse movement. Additional magnets can be bought ($3 each) to give part-rotation measurement. The 5mm by 5mm cylindrical magnets are glued into holes drilled into the drum. The magnets must pass within 5mm of the sensors to read them properly.

Without calibration, the system will display drum rotations. With calibration, the system will read in metres from a zeroed position, but translates proportionally from number of rotations to a given unwound length. A calculation based on 19mm rope and calibrated at 190m estimates that at 163m of rope out the display would read 159m (-2.5%). This may be sufficiently accurate for most applications of the system.

Alternatively a laser rangefinder could be used to measure distances. A Bushnell Scout 1000 retails for approx. $799 incl. GST and Leica CRF 1200 for approx. $1445 incl. GST.

An encoder-based system associated with the main rope or skyline sheave would be a more precise method because the rope unwound is directly measured. Two Austrian yarder manufacturers each make a yarder (the Koller Multimatik and the M-M Forsttechnik Syncrofalke) where carriage position and speed can be displayed in the cab, and the carriage returned automatically to previous breakout location.

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Conclusions

Yarding distance measurement can provide an operator with the information to return rigging or carriage quickly to the breakout site. It can also be used to reference aspects of difficult terrain that will be encountered on successive haul cycles.

Skyline drum rotation measurement can also aid an operator in returning a lowered skyline to its previous position.

Measurement and recording of yarding distance also has the potential to add valuable data (average haul distance) to shift-level information (such as average cycle time, production, haul size per rope shift) collected from yarding operations.

References

CruzPro Ltd:
www.cruzpro.com/

Koller Multimatik:
www.kollergmbh.com

M-M Forsttechnik Syncrofalke:
www.mm-forsttechnik.at