

P.O. Box 147, ROTORUA, New Zealand. Telephone: 07-348-7168 Facsimile: 07-346-2886

# TECHNICAL NOTE 7168 886 TN-5

## **REMOTE TENSION MONITOR FOR CABLE HAULERS**



Figure 1 - Remote Tension Monitoring System

## INTRODUCTION

Understanding the performance of forestry machinery and monitoring its use is becoming increasingly important in order to maximise productivity while maintaining safety. In the complex and dynamic system of a cable hauler operation, knowledge of line tensions has up until now been very limited and often a matter of operator experience.

In 1990, LIRO commissioned the development of a remote tension monitoring (RTM) system for cable haulers. The aim of the RTM system was to produce a tool for everyday use by hauler operators and contractors. The system measures line tensions on stationary ropes and transmits this information to a display unit in the hauler operator's cab. Up to six load cells can be attached to the guylines and skyline on a hauler.

The prototype system is being trialed in New Zealand to give hauler crews a chance to use and comment on its features.

## SYSTEM APPLICATIONS

## Safety

To prevent overloading of ropes the system is fitted with an alarm, both visual and audible, which is activated whenever the safe working load (SWL) of a rope is exceeded. The operator, once alerted by the alarm can decrease the line tension to within the SWL.

## Training

Displaying tensions to new operators should enable faster familiarisation with the hauler and provide information when experienced personnel are not available. Operator trainers should find the RTM a useful tool for explaining the changes in rope tensions at various parts of the cycle.

#### Productivity

By using the tension information provided, operators may be able to adjust drag volumes in co-operation with the breakerout to optimise payloads. LIRO is currently investigating this possibility.

#### **Guyline Set Up**

Guyline layout and pre-tensioning are procedures requiring experience and careful attention to detail. The remote tension monitor will be useful for ensuring correct setup and load sharing of guylines. The tension information will also give an indication as to whether a stump is holding or not. Guyline monitoring is an important aspect of the safety of an operation.

#### Display

Figure 2 shows a sample screen output. The tension in GUY 1 is 70% of SWL, GUY 2 has a tension of 45% of SWL, GUY 3 is switched off or out of range and GUY 4 has zero tension in it. SKY shows the tension in the skyline as exceeding the SWL of the rope. The alarm buzzer would be sounding.



Figure 2. Sample display screen output

Future versions will display the extent of shock overload peaks on a similar horizontal bar scale.

#### SYSTEM SPECIFICATIONS

#### **Display Unit**

- \* Operating voltage: 12-30 volt D.C.
- \* Alarm: visual, reverse bar colour - audible, loud buzzer
- \* Liquid Crystal Display
- \* Keyboard access to set up menus
- \* Backlit for dim light conditions
- \* Download facility for storage and analysis of tension data on portable computer
- \* Allows for reduced breaking strengths of damaged or worn ropes if required
- \* Display accuracy: 2.5 % of safe working load

#### **Radio Equipment**

- \* Range: 600 m (or more in good conditions)
- \* Frequencies: Band C. Telemetry, Channel 1-8
- \* Aerials: 435 mm, stainless steel wire

#### Load Cells

- \* For use on stationary wire ropes; guylines, skyline etc.
- \* Rope diameters: 19, 22, 26, 28, 32 mm
- \* Weight: 14.5 kg
- \* Carry strap attached
- \* Fitting time 2-3 minutes per dynamometer
- \* Fits to slack or tensioned rope
- \* Load cell range: 25,500 kg tension max
- \* Design strength: 70,000 kg tension max
- \* Battery life: 5 days (10 hrs/day)
- \* Accuracy: 1-4% of safe working load
- \* Robust and waterproof

**Cost** - The cost for a system consisting of 3 load cells, display unit and necessary accessories is approximately NZ\$32,000. However, the system is available to New Zealand resident contractors for NZ\$22,000.

Remote tension monitoring systems are available from Actronic New Zealand Limited, Auckland.

M. Smith, <u>Researcher.</u>

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