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AUTO-TENSIONING LOAD RESTRAINTS

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Introduction

To address the problem of log loss when hauling logs in Alberta, the Forest Engineering Research Institute of Canada (FERIC) designed, built and evaluated a prototype auto-tensioning wrapper for pole-trailer logging trucks. The results of their investigation has applications for New Zealand log transport operators especially when transporting pealed logs, which have a greater risk of falling from the truck, or when transporting full or long tree length logs. This Technical Note outlines the research, results, and possible applications for New Zealand.

Background

Transporting logs with significantly pronounced taper, and non-uniform log lengths, run the risk of log loss as the load settles during transportation and load restraints become loose. Conventional load restraints do not provide any slack compensation (i.e, they do not automatically tighten when the restraint cable or chain slackens). This situation can lead to logs being lost which may cause a hazard for other road users.

To address this issue, FERIC designed and evaluated a prototype auto-tensioning wrapper to alleviate the log loss.

Load Restraint Equipment

The auto-tensioner device is wrapped around the load in a looped lasso-type arrangement and attached to the trailer's bunk. The primary components of the auto-tensioning wrapper are the controls, air cylinder and rigging (Figure 1). The rigging was made up of 8 mm aircraft cable and two sheave blocks. The line was deflected out towards the rear of the load and through a sliding choker hook (Figure 1). It then passed over and around the load, where an eye at the end of the cable connected back to the choker hook, forming a tensioning loop around the load. The 2-pass rigging therefore provided 610 mm of slack compensation from the 305 mm stroke air cylinder. The optimum cable length was determined to be 13.7 m, which was the minimum required to secure a typical 9 m overhang.

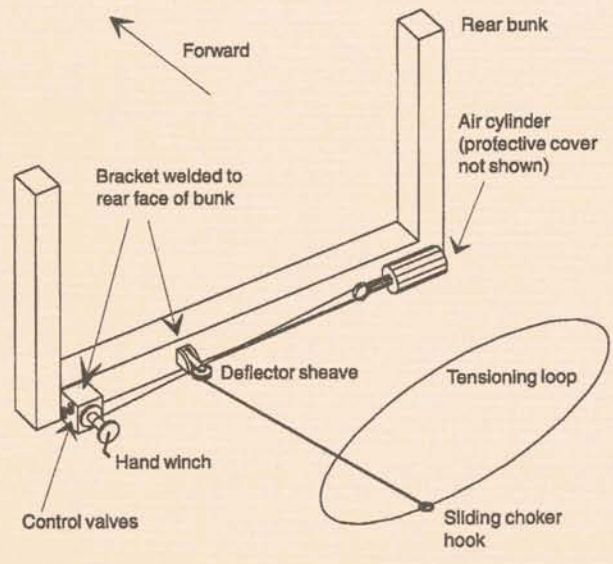

Figure 1 - Auto-tensioning equipment

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Figure 2 shows the pneumatic plumbing design. Safety systems including a pressure protection valve isolates the trailer's air brake system in the event of a leak.

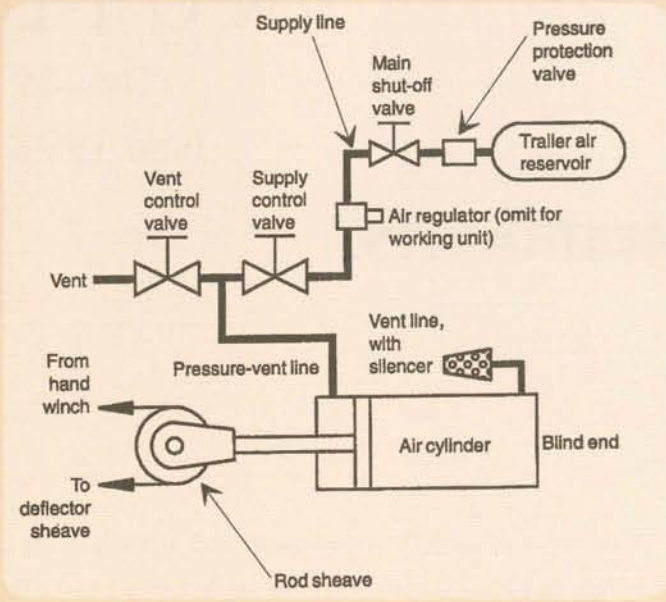

Figure 2 - Pneumatic pluming schematic

Operation

Ease of operation was one of the main design objectives. The cable is simply released from the hand winch and thrown around the load in the usual manner. Releasing the air cylinder and winching in the excess cable extends the cylinder ram and pre-tensions the system. Supply air is then applied to the cylinder and further tensioning occurs, the tension in the loop is maintained until the cylinder fully retracts. Adequate slack can be checked by glancing at how much stroke remains in the air cylinder. Adjustments can be simply made by releasing the air pressure and winching in more cable thereby extending the air ram, re-pressurisation of the system again re-tensions the load.

Load Securement Evaluation

The tensioning loop of the auto-tensioning wrapper did not tend to creep forward, but bundled and secured the load at the original placement position. The further back along the overhang it was placed, the more it compressed the load into a tighter bundle. When placed close to or directly at the bunk, the tensioning loop forcibly pulled the load down into the trailer's rear bunk.

Maintenance

The air cylinder should last at least five years with only minor maintenance required during that time. Seals and cable should be replaced every year, and manually extending and retracting the ram once a month, if not in use for extended periods of time, should also be completed. Periodic greasing of sheave blocks will maintain them for approximately five years.

New Zealand Applications

Although FERIC conducted these trials to suit their operation conditions, there are some fundamental applications for this product, or a similar product, in New Zealand.

Full tree or long length cartage of logs occurs in New Zealand and can have significantly pronounced taper to warrant such a system. Mixed log length loads are also frequently transported.

Modified alternative systems, or off-the-self systems, may be beneficial to any log truck and trailer, ensuring the load restraint tension is maintained throughout the journey, compensating for load settlement.

Cartage of pealed or mechanically harvested logs is well known to be difficult and dangerous due to the slippery nature of the logs. The use of self-tension load restraints may alleviate the problems and reduce the risk of log loss.

Reference

David V. Hart (1997): "Reducing Log Loss From Tractor/Pole Trailers Hauling Butts-Forward Loads" Roads and Transportation FERIC Technical Note TN-256

Exte Fabriks AB (1997): "Exte LuftMan Twin" Exte Fabriks AB promotional material, Sweden