



SPINNAKER CORPORATION
EQUIPMENT AND PROCESS SOLUTIONS

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Trouble Shooting Rope Systems

Low Hanging Fruit

All paper, board and tissue machines have one thing in common: a tail has to be threaded from the wet end to the reel before tons can be produced. Even after the machine is humming along, the sheet can and does break requiring the tailing/threading process to be repeated. A frustration that all machines have faced at one time or another is to be ready for production but unable to get the tail through to the reel efficiently.

Newer high speed paper and tissue machines employ air chutes, vacuum belts, and other rope-less threading methods. But the majority of paper machines employ a two or three rope system to transfer the tail from the forming section or press, through the dryers, size press, calender and into the reel. Some of the problems commonly encountered in rope systems are:

- Tail doesn't transfer from one section to the other
- Tail folding over and becoming caught resulting in the tail breaking
- Tail falling out of the ropes
- Short rope life

When properly installed and maintained, the rope system is a simple and reliable method of tailing a machine. It is inexpensive, easy to maintain, and requires little human intervention. As the sub-title implies, this article will describe rope system problems that are relatively easy to identify and correct.

Pulley Alignment

One of the most common issues is pulleys out of alignment. This can be caused by: a wad or sheet break knocking the pulley askew; improper installation after removal for maintenance; getting bumped during installation or maintenance of adjacent equipment; etc.

Although one or a couple of pulleys out of alignment may seem insignificant, especially when there are so many in a large PM rope system, it can create many minor to major problems. If one or more of the pulleys at the end of

a rope section are out of alignment, the tail may fall out prematurely, or be held past the optimum point for transfer to the next section. If out of alignment at the incoming rope nip, the tail may fold over and/or fall out. Both result in tailing problems and lost production.

One or more pulleys out of alignment can cause the ropes to rub against each other, frames, and other equipment. When a pulley is out of alignment to the rope run, the rope will run to the edge of the pulley and rub on the flange. The smooth carrying of the tail can be disrupted by these interferences causing the tail to fall out. And ropes rubbing against machinery and/or pulley flanges will lead to shortened rope life. The rope splices are especially vulnerable to failure due to the increased stress and friction.



Rubbing Against Frames



Rubbing on Flange

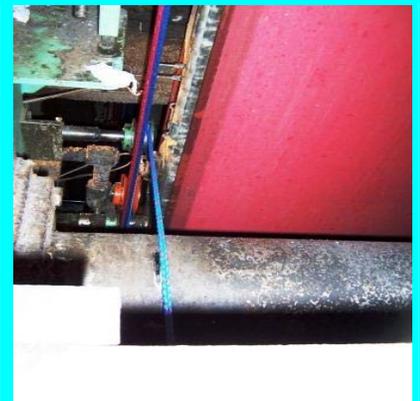
A pulley that is out of alignment is much more likely to have the rope jump off when a sheet break or wad comes through.

Interference

Closely related to pulley alignment is the problem of ropes running against pieces of equipment due to other reasons. This can occur when equipment is changed-out/replaced, or

new equipment is added. Often the ropes are removed during this process, the equipment installed, and the ropes re-strung without checking for the proper clearances.

Ropes can also run against machinery and frames due to incorrect stringing of new ropes.



Rope Strung Incorrectly

Pulley Diameter

When it comes to rope pulleys, bigger is better. A larger pulley means the rope makes a larger radius turn which reduces the stress on the rope during the turn. Conversely, smaller pulleys increase rope stress on the turn, especially in the splice area. As a rule of thumb, pulleys with greater than 90 degrees of rope wrap should have a minimum 8" groove diameter. Larger such as 9" or 12" is even better when practical to install.



Small Pulley = Rope Stress

Prevention

“An ounce of prevention is” Add a walk-down of the rope system to your regular maintenance tasks during normal shut downs for clothing and/or wire changes. Look for the conditions identified above. It’s also a good idea to check the condition of each pulley’s bearings by manually rotating it, and trying to move it from side to side. If it is hard to rotate, or has excessive lateral movement, the bearings are candidates for replacement.

Also look for small diameter pulleys with large rope wraps and consider replacing them with larger diameter pulleys. If and when you do, ensure that there are no interferences with the changed rope run.

Rope Stretchers

Many PM's employ the older cable style stretcher with fixed weights on a cable to apply rope tension. Others use older, bulky carriage type arrangements. Both types have similar drawbacks:



Inefficient Stretcher

Inherent hysteresis in the system requires additional force to overcome. This increases the overall force in the system and tension on the ropes and splice.

Typically these systems run at a constant, high rope tension.

Very hard to fine tune for the correct rope tension for efficient tailing.

Some are oriented in the cross machine direction resulting in ropes making 90 degree turns. This increases rope stress, especially in the splice.

The older stretchers then can be a major contributing factor to short rope life, and tailing efficiency problems. Newer stretchers use light weight components on free moving carriages with rod-less pneumatic cylinders. They also include a dual mode control system for "Run" and "Thread". In "Run" mode, the rope tension is set at the lowest level practical to keep the ropes on the pulleys. In "Thread" mode, initiated via a signal from the web break detector, rope tension is automatically increased to that required for efficient tailing. Considering that most PM's spend much more time running than tailing, this ability to reduce rope tension during running makes a significant contribution to improved rope life. As important, the ability to fine tune the rope tension for threading improves tailing efficiency.



New Stretcher

Although not as easy or inexpensive to correct as pulley alignment and rope interference problems, updating the rope stretchers can go a long way to improving the performance of the rope system, and reducing the cost and labor associated with short rope life.