"Haggie Hints"

by George Delorme
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Haggie North America - Meeting your hoisting needs!

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Torque in a Stranded Hoist Rope

Most drum winders around the world use Flattened Triangular Stand (FTS) langs lay hoist ropes and as a result, torque is one of the unpleasant characteristics that must be managed. Compared to other rope constructions, the advantages of the FTS far outweigh this one issue.

PROBLEM:

The torque in a 6 stranded hoist rope is ever present and has the following effect:-

- If the load is released, the rope will form a "pig tail" and if re-tensioned without manual intervention to control the loop, a "kink" will be formed. Tests have shown that as much as 50% of the strength can be lost at the kink.
- Rope torque will want to twist the conveyance and all its components and will cause wear on attachments, pins, guide rollers etc.
- Excessive torque can promote an elliptical whip in the rope between the drum and the headsheave.

CAUSE:

By definition, the langs lays hoist rope has the wires and the strands spun in the same direction. While this configuration offers advantages in wear resistance and better fatigue life, it has no spin resistant characteristics. When loaded, both the wires and

the strands want to unlay with the result that all langs lay ropes will develop torque when loaded.

Some manufacturers will "post-form" or draw the triangular strand through a box of off-set rollers in order to minimize the torque, but in so doing causes the triangular shape to be rounded. While this is marginally successful, it may have a negative impact on the wear resistance of the rope itself.

A main contributor of the torque is the method by which we use the rope. If a rope was loaded horizontally, the lays would increase equally along its length. Once un-loaded and forgetting about construction stretch for the moment, the rope lays would return to their original positions.

Because we work the rope vertically, the situation completely changes. As Fig. #1 shows, because of its own weight, the section of rope at the top of the shaft is loaded considerably heavier than the section immediately above the conveyance. Therefore, the lay at the top becomes longer than the manufactured value and the lay above the conveyance is forced to be shortened. This lay change commences the first time the rope is lowered to the shaft bottom and continues throughout the rope life but it is much more pertinent during the time that the rope is "bedding in". As we hoist, this longer lay at the top is trapped on the drum and with each cycle, we continue to compress the lay above the conveyance which results in excessive torque being displayed at this end.

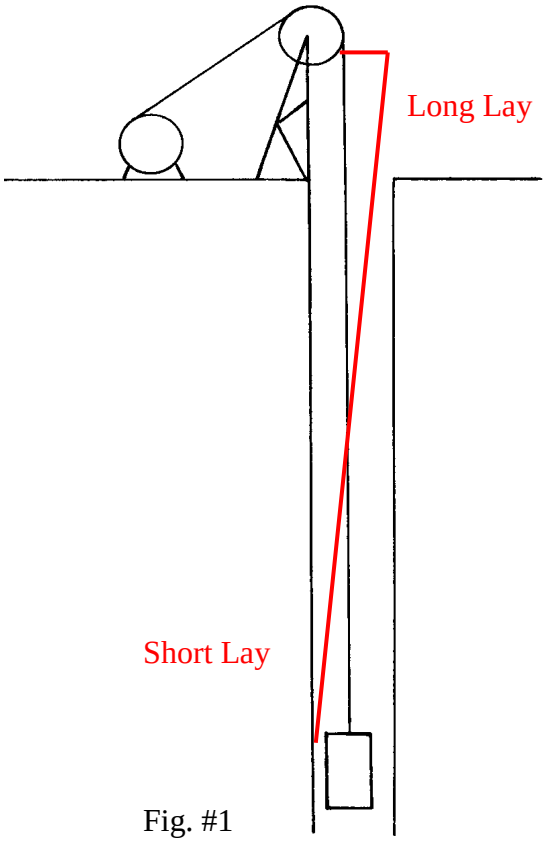

Fig. #1

As mentioned in the #4 issue of the Haggie Hints, an undersized groove of a plastic headsheave liner can milk or displace strands forcing the lay to be compressed at the conveyance and adding to the amount of torque in a rope.

This phenomenon is more noticeable with deeper mines since the rope weight is considerable and in some cases, the "as manufactured" lay at the upper sections of rope can increase by 80% and reduce by 20% above the conveyance.

An interesting fact is that the torque produced is independent of the length of rope suspended and is proportional to the load but the number of turns to come out of that rope is dependant on the length.

REMEDY:

Because the compressing of the lay above the conveyance is a result of hoisting vertically, we must remove some of this excess torque on a regular basis. This must be done only at the collar level and NEVER at the shaft bottom. It is particularly important to do so during the first three months as the rope is bedding down. Idealily, the rope end should be released after the first week or two and again after a month. Afterwards, unless there is a need, this "torque release" can be carried out at the regularly scheduled conveyance end cuts.

Care must be taken to prevent injury from the spinning rope when removing the fitting from the conveyance and must be done so under control. The use of a cross-head conntected to the rigid guides and some form of a "release" rotating clamp will assist. The rope turns should be released slowly and recorded as a matter of interest. At each release, it is not necessary to put back any turns.

CONCLUSION:

While we must live with the torque that naturally exists with this type of rope, we can make our lives easier by removing the excess amount on a regular basis. The many benefits of this rope makes it well worth the effort.