

Operating Techniques

Operating techniques are just as vital to wire rope performance as installation procedures, condition of sheaves and drums, and wire rope maintenance programs. To receive the best service life and value from your wire rope products, follow these basic guidelines.

Open the Mine Cut

Opening the mine cut prevents the formation of roll piles. Wire rope continually pulled through the roll will develop martensite (refer to Bethlehem Wire Rope® for Mining Applications Technical Bulletin 1), a brittle constituent of steel that causes immediate wire breaks and ultimately rope failure if not properly monitored. The ropes saw through the dirt and rocks and begin to “burn”, which is easily identified by the rope’s producing sparks during operation. Martensite is an irreversible condition and will lead to quick deterioration of the rope. Due to the seriousness of this condition, the drag ropes must be kept out of the roll.

Advance the Dragline

Advance the dragline two to three steps as the drag chains and ropes near the crest of the cut face. While some operations have gone to a double stepback to reduce walking time and increase digging time, this has a negative effect on rope service life because the ropes are continually pulled through the roll and burned.

Keep the Wall Angle at 45° to 55°

Keep the cut face wall angle at 45° to 55° and free of excessive material until the dragline has advanced to its final position. Too shallow of a cut promotes abrasion damage and the formation of martensite. Likewise, a cut that is too steep will also create abrasion damage, as well as create a severe bend in the rope which will lead to high stranding, fatigue, breaks and looped wires.



Figure 1: Tightlining as shown in this photo creates extreme pressure on the hoist rope.

Fully Pay Out Drag Ropes

Pay out drag ropes fully when hoisting to prevent a static or dynamic tightline condition. A tightline condition always occurs when the bucket is lifted prior to fully paying out the drag lines. In this situation, the drag and hoist ropes actually work against each other. This “tug-of-war” action causes the hoist rope to become overloaded. In addition to the high stress caused by tightlining, an overloaded rope will produce high stranding, looped wires, a popped core and/or complete failure.



Figure 2: The untrimmed wires in this mining rope caused premature rope retirement.

Keep the Boom Over the Bucket

Misalignment of the bucket and boom during operation creates new wear areas on the hoist rope at the boom point sheave. Caused by the rope’s pulling to one side or the other, rope problems caused by this operating technique include fatigue breaks at the point of contact, looped wires, and high stranding in some instances, as well as potential damage to the sheave.

Remove Broken Wires

Cut off broken wires on an operating rope to prevent damage to adjacent wires. If the broken wires remain intact, they will saw through nearby wires and cause premature retirement of the rope. (See Figure 2)



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Monitor Changes in the Rope Equalizers

Sudden changes in the rope equalizers signify a change in the condition of the rope, such as strand or core failure. Report and inspect the rope immediately if unequalization occurs.

Keep Drums Lubricated

To prevent abrasion damage to the ropes and drums, ensure the hoist and drag drums are well-lubricated.

Control the Hoist and Drag Rigging

When chop cutting and casting, keep control of the hoist and drag rigging so the dump wedges do not loosen and the dump ropes do not slip. Refer to Bethlehem Wire Rope® for Mining Applications Technical Bulletin 4 on Dragline Rope Maintenance.

Do Not Snap the Dump Ropes

When setting up for bucket service and lifting the bucket after service, pay close attention as to not snap the dump ropes on the drag hitch pin, trunnion pin or cheek corners. If the dump ropes are snagged when setting up for service, the chance of damage from abrasion at the point of contact is increased. If the rope is still hung up when lifting the bucket, one of the ropes may become overloaded.

Ensure Hoist Chains Are Tight

Ensure hoist chains are tight before hoisting the bucket to prevent shockloading the hoist rope. Shockloading occurs when a wire rope goes from no load to full load or full load to no load in a matter of seconds. The sudden release causes high stranding and core protrusion, and ultimately leads to an overloading of the remaining strands.

Use a Reduced Reference

Bring the bucket into the cut at a reduced reference on the drag control to prevent shockloading the drag ropes and rigging. Shockloading any wire rope can lead to shortened service life and catastrophic failure.

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