



Why inspection is practical to your long-term success

Despite their durability and strength, wire ropes used on shovels and draglines will eventually wear out and need to be retired from service. That's why you need to regularly inspect your ropes – not only to determine when they meet the removal criteria, but also to establish normal wear patterns so you can detect and correct unusual wear patterns. This section offers you general guidelines on wire rope inspection.

HOW OFTEN TO INSPECT

Obviously the more you use a wire rope, the more often you need to inspect it. It makes good sense to visually inspect all working wire ropes on a frequent basis. Any areas of wear, damage or broken wires should be marked and observed while the rope is in service. When or if a problem is found, you can better identify the locations the area contacts and whether the problem is caused by the rope itself, the equipment or simply operator technique.

There are no established industry standards to determine the exact time to replace surface mining ropes because so many variables are involved. It's also important to remember there are minor – sometimes major – differences among installations, even on machines with similar designs. Both are excellent reasons to use the best judgment of a trained, qualified person to conduct proper rope inspection.

Information from the inspection should be recorded so that you have a basis for judging the rate of change in the condition of a wire rope. A sudden change is more critical than a gradual change.

FOCUS ON YOUR ROPE'S CRITICAL POINTS

While you should check the entire length of each rope for any unusual or isolated damage, there are several critical points in a rope subject to greater internal stresses, greater external forces or that are more susceptible to damage. These points tend to deteriorate more quickly, so it pays to focus on these important areas:

PICK-UP POINTS These are sections of ropes contacting the sheaves or the drum when you apply the initial load of each lift. Accelerated internal and external wear occurs at these points for two reasons: higher loads from acceleration and the rope's radial transfer of load to the sheave or drum. Look for diameter reduction, broken wires, wire wear and wire deformation at these locations.

END ATTACHMENTS End attachments on wire ropes restrict the free movement of wires, normally leading to the broken wires adjacent to the end attachment. If broken wires are seen, cutting off the affected area and resocketing can extend the rope's service life. Corrosion can be more prevalent in this area. Be sure to also inspect the fitting itself.

SHEAVES The grooves on sheaves normally wear smaller over time. With a groove gauge, check each sheave for proper groove size and contour, as well as smoothness. Grooves that are too small or tight can cause pinching and increased wear while grooves that are too wide can cause flattening of the rope – both of which can reduce your rope's life. Also check each sheave to make sure it turns freely, is properly aligned, has no broken or cracked flanges and has bearings that work properly.

On sheaves that have grooves for two ropes (found in most 4-rope draglines), groove depth is critical. If the depth is not the same, one or both ropes will have to slide in the grooves as the sheave rotates. This will cause accelerated wear and damage to the rope.

DRUMS AND HOW TO PREVENT CORRUGATION

Drum surfaces may develop a wavy pattern with the lay of ropes over time, leading to worn grooves that can cause premature wire breaks due to the corrugation. You can help prevent corrugation by alternating right lay and left lay rope with standard uncoated wire ropes. Or use our PFV® ropes because the coating on these ropes distributes the radial pressure on the drum, effectively preventing drum corrugation.

OTHER POTENTIAL AREAS OF CONCERN THAT YOU SHOULD INSPECT OFTEN

ABUSE POINTS Check for “bright” spots where ropes are subjected to abnormal scuffing and scraping.

HEAT EXPOSURE Watch for evidence of heat exposure which can damage the rope and its lubricant. Contact with an electrical arc such as welding can cause localized wire breaks. Never use the rope as the ground for an arc welder.

MULTI-LINE DETERIORATION Because many machines use two ropes at the same time, check to see if damage occurs in one – or both – ropes to help you identify the cause of the wear.

HOW TO FIND AND TRIM BROKEN WIRES

One of most common signs of rope deterioration is broken wires, normally crown and valley wire breaks. Both types cause the same loss of strength, but valley wire breaks can be more difficult to find. During your inspection, it's very important to search for broken wires and identify the locations in the system where they occur.

CROWN BREAKS These appear at the crowns of strands. You can enhance your visual inspection by running a cloth along the rope. If there are any crown wire breaks, they will snag the cloth.

VALLEY BREAKS These broken wires aren't as obvious. With an awl, probe between wires and strands and lift any wires that appear loose. Evidence of internal broken wires may require a more extensive rope examination.

DON'T OVERLOOK BOOM PENDANTS

Often composed of structural strand, boom pendants are subject to vibratory fatigue at end attachments and at points where they run through the dampeners between the pendants. Regular inspection is critical. Broken wires at the socket or dampener are an indication of deterioration. When it comes time to replace your pendants, we recommend you replace the complete set of pendants – all the uppers or all the back stays, for example – because of the differences in operating characteristics of a new and used pendant.

KEEP RECORDS ON ALL MACHINES

Good recordkeeping helps your company's maintenance program do what it's supposed to do: keep downtime and operating costs to a minimum and promote good operating practices.

By keeping accurate, up-to-date records, you have a complete history of your wire rope's performance. Changes in service can indicate the existence of a problem – either on the machine, digging conditions, operators or the rope itself.

Be sure to record any unusual events that occur in your rope's service life.