

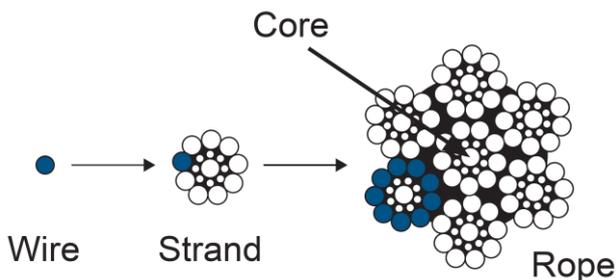
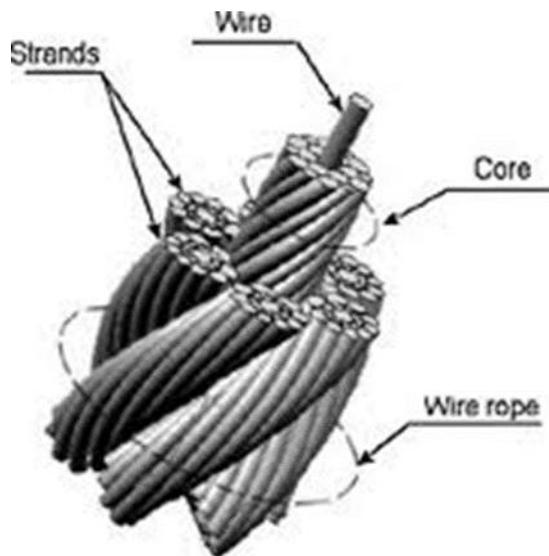
Greetings all. Today's Bulletin is about wire rope inspection.

During the month of June, CICA has been holding training or refresher training, provided by Bullivants in the capital cities on wire rope inspection. About 100 people participated, and the attendees included CraneSafe Assessors and riggers from mobile and tower crane companies.

Recently, there have also been a couple of wire rope failures that are still under investigation.

### Understanding wire rope construction

Wire rope consists of a series of individual wires that are twisted into strands, and a group of strands form a rope. This twist creates an internal torque in the wires. When under load the wires want to unwind to release the torque. In other words, the individual wires want to straighten out.



The construction of wire rope will be determined by its intended use. Non-rotating rope is commonly used for hoist rope because it reduces the amount of spin the hook block and load experience. Ordinary lay or Lang's lay rope (or non-non-rotating rope) is used on luffing rope and slings.

Non-rotating rope has a core that is formed in the opposite direction to the outer strands to create a torque cancellation effect when loaded.



It is important that the wire rope construction is considered when determining which rope should be used as a sling or on the crane.

Mill certificates are provided with rope, and the certificate details the number of wires and the number of strands, and minimum breaking strength (MBS). Wire rope is required to have a breaking strength of 5 times the rated capacity.

Common wire rope constructions in the lifting industry are 6x25 (150 wires) and 35x7 (245 wires).

### Effects of Bending Fatigue

In steel structures, like crane booms, we often talk about metal fatigue. All materials have fatigue properties, but we don't often think about fatigue impacting wire rope because they are usually replaced before reaching their fatigue limit due to wear or damage. Bending fatigue leads to broken wires, which leads to overloading the rope because the remaining wires take the rated load.

[Roland Verreet \(Verope / Casar\) created a bending fatigue machine](#) that shows the rate of maximum breaking strength as a function of bending fatigue.

His full paper can be downloaded [here](#).

### Discard Criteria for Wire Rope

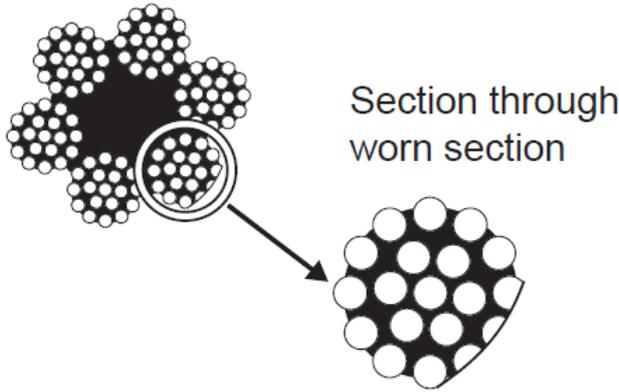
- a. Broken Wires - The previously mentioned rope construction will determine the number of allowed broken wires.

**10% is not the allowable number of broken wires.**

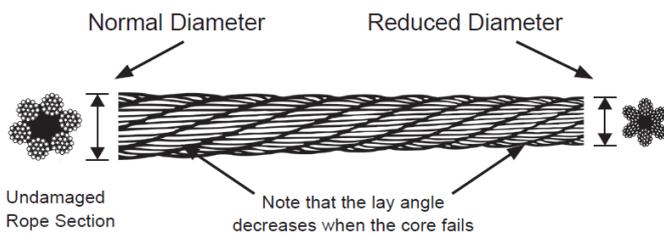
Up until 2019, in high-risk work licence assessments, doggers and riggers were taught to use 10% as the rule for wire breaks. **THIS IS INCORRECT!!!**

The allowable breaks for 6x25 is 5, not 15. And 35x7 is 2, not 24. This information is found in AS 2759 for crane, hoist, and general lifting rope.

- b. Outer wires are worn by 1/3 their diameter.



- c. Loss of diameter by 5% of the rope diameter.



- d. Mechanical damage, or corrosion, or both.



Greasing wire rope will help keep the rope from getting corrosion both on the surface and internally. Several automated grease applicators for wire rope ensure you get sufficient grease without over-greasing. Excessive grease can cause dirt and debris to adhere to the rope and cause premature wear. Greasing an already corroded rope will not remove the existing corrosion.

**In Conclusion**

Wire rope is a key component on various lifting equipment from cranes, piling rigs, draglines, etc. It is considered a consumable item that needs to be monitored for wear to determine when replacement is necessary.

Here is a simple poster from Bullivants that shows how to evaluate common crane ropes.



Stay Safe - CICA

**Maintaining Wire Rope**

[Regular checks should be performed when wire rope is in service to ensure continued safe operation.](#) The inspection interval will depend on the working environment in which the crane or hoist is operating.

When repetitive tasks are being performed, the same section of rope will be travelling off the drum, over the sheaves through the block and back to the anchor point. Attention should be paid to this section of used rope because it has higher running use and bending cycles. In some industries where this concentrated use is common cut off a section of rope periodically to intentionally change the running length.