

# LOOK INSIDE YOUR WIRE ROPE

Barrie Mordue of Tensology spoke at the LiftEx conference about the important role magnetic wire rope testing can have in the safety and economics of inspection and discard of wire ropes.



Traditional wire rope inspection techniques are essentially a visual inspection, which, according to Barrie Mordue, director at Tensology, do not adequately establish the internal condition of a wire rope. For rotation resistant, multi-strand ropes, difficulties in assessing the internal condition is of particular concern. Degradation of the inner strands will affect the distribution of forces in the rope, which significantly reduces the ultimate load bearing capacity and increases the torsional moments on the outer strands, reducing fatigue life.

The traditional test is a section test - opening up the cable's fibres to look at its condition - some methods recommend the use of clamps in this processes others say no-clamps. Once the section has been inspected it needs to be 'squashed' back to its original shape, which can introduce new pressures to the rope.

This method has a number of limitations: it can only be carried out under no tension; heavily lubricated rope is hard to visually inspect and plastic coated or PFV (plastic filled valley) rope cannot be inspected at all.

Plasticating wire steel rope has some advantages: there is additional cushioning and no high pressures can enter the core. PFV rope has thermo-plastic infused around the component strands and fills the valleys of the rope. The manufacturers claim that the plastic reduces wire contact, provides greater wear area, locks in lubrication, and inhibits internal corrosion. The rope diameter is not increased.

But, internal examination using traditional techniques is next to useless.

Even if you can visually inspect the rope, you cannot see the whole length of the rope - maybe just 10% and then you may only have access to one side of the rope - so possibly just 5% is inspected

When you consider what a vital role the ropes play and the considerable cost of too early discard, this method appears unsatisfactory.

In order to "look inside" a rope, equipment has been developed, which allows the user to establish the condition of the wires and strands inside the rope without physically opening up the outer strands. Magnetic Rope Testing (MRT) is not a new technology and in some industries such as mining ropes and

offshore it is well established. The method measures magnetic flux leakage along the length of the rope. The variation in magnetic flux is directly proportional to the steel area so it is clear if any material is lost. Other sensors look for flux leakage, which indicates a broken wire.

Tensology's equipment can simultaneously detect localised faults (LF) such as wire breaks and any loss in metallic area (LMA) caused by internal corrosion. The location of any LFs or LMA is recorded by the equipment, allowing areas of concern to be closely monitored during future examinations.

The rope can be run through the head of the testing equipment or the head can be run along a rope in-situ. The equipment can locate where the problem in and the degree of damage.

While often used to assess the condition of existing used ropes, MRT can also be carried out prior to a rope going into service. Results from the MRT of a newly manufactured rope can be stored and used as a reference for future examinations. Inspectors can see how it degrades test-by-test so trends can be determined.

MRT can be used on multi strand rope - fretting corrosion where wires rub together would be hard pressed to find without MRT. You can use MRT on plasticised rope and heavily lubricated rope.

The IMCA (International Marine Constructors Association) says that wire rope must be magnetically tested - all offshore contractors use it

Magnetic rope testing is an essential part of any rope examination but should not be considered in isolation. Various standards and codes provide rules and guidance for the inspection and examination of wire ropes such as ISO 4309 - Cranes - Wire Ropes - Care and Maintenance, Inspection and Discard. Local regulatory requirements should be considered prior to conducting any rope examination.

The ISO4309 International Standard establishes general principles for the care and maintenance, and inspection and discard of steel wire ropes used on cranes and hoists. This year ISO4309 is being revised to include MRT. The inspector will need proper training in the use of the equipment and be a competent rope examiner. The use of MRT is not compulsory but will be recommended by the revised standard.



Barrie Mordue