

SAFETY BULLETIN

DATE: NOVEMBER 2019

Hoist rope unravels over head sheave

This safety bulletin provides safety advice for the NSW mining industry relating to small gemstone mine person-riding hoists (winding systems).

Issue

A person-riding gemstone hoist winch rope was found with the inner strand of the rope protruding from the rope lay in two places. This condition reduced the strength of the rope. This may have caused it to break and injure people, on or under the conveyance.

Figure 1 Hoist rope with inner strand protruding

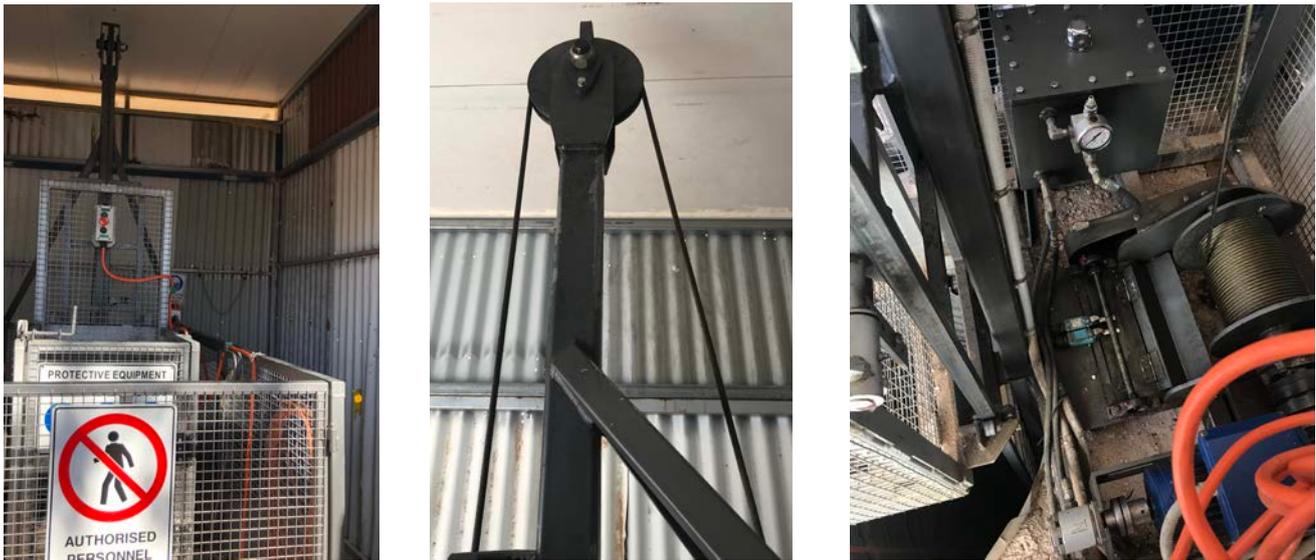


Circumstances

The 33-metre wire rope was installed on a man-riding hoist that was registered to carry one person at a small gemstone mine shaft.

The 8-millimetre diameter non-rotating wire rope lay in a 12-millimetre diameter head pulley groove.

Figures 2, 3 and 4: Arrangement of the hoist showing the conveyance, head sheave and winch drum.



Investigation

In two places, the inner strand protruded from the outer rope layer as shown in figure 1. In other areas, some wires were found to be proud of the rope profile, as shown in figure 5 below.

The rope lay length, which is the period of one strand from where it comes around the rope to the next in-line position was measured. The lay length was found to increase along the rope, affecting the non-rotating properties of the rope.

Figure 5 Proud wires corresponding to shortened lay length

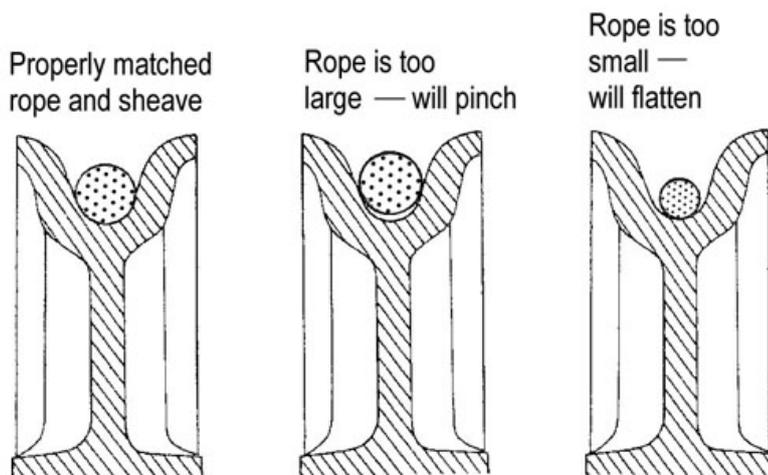


When the rope was unloaded, the built-up torque in the rope resulted in two rope distortions occurring where the inner strand protruded from the rope.

Sheave compatibility factors

The rope condition is believed to be affected by compatibility factors associated with the head sheave groove dimensions.

Figure 7 Head sheave groove diagrams showing matched, tight and too large rope groove conditions.



Rope strength loss

The rope breaking force of the damaged rope was found to have lost 10% of its strength where the wire was proud of the rope and up to 50% loss of strength where the inner strand had protruded.

Recommendations

Mine operators should:

- carry out a visual inspection of hoist ropes to look for evidence of protruding wires or strands. If protruding strands are found, the rope must be replaced.
- measure both the head pulley groove diameter and rope diameter. Ensure that power to the hoist is isolated, all energy has been dissipated and safe access for working at heights is in place before taking measurements.
- consult the hoist designer to determine if the rope in service is compatible with the head sheave design.

- adhere to Australian Standard AS 3785.7 *Underground mining equipment – Sheaves* which gives guidance that the head sheave groove diameter should be 7.5% to 12% greater than the nominal rope diameter for which the sheave is designed.
- ensure that the sheave diameter should be equal to or larger than the diameter of the drive drum.

NOTE: Please ensure all relevant people in your organisation receive a copy of this safety bulletin and are informed of its content and recommendations. This safety bulletin should be processed in a systematic manner through the mine's information and communication process. It should also be placed on the mine's common area, such as your notice board where appropriate.

Visit our [website](#) to:

- find more safety alerts and bulletins
- use our searchable safety database
- sign-up to receive mine safety news.

© State of New South Wales through Department of Planning, Industry and Environment 2019. You may copy, distribute, display, download and otherwise freely deal with this publication for any purpose, provided that you attribute the Department of Planning, Industry and Environment as the owner. However, you must obtain permission if you wish to charge others for access to the publication (other than at cost); include the publication in advertising or a product for sale; modify the publication; or republish the publication on a website. You may freely link to the publication on a departmental website.

Disclaimer: The information contained in this publication is based on knowledge and understanding at the time of writing (November 2019) and may not be accurate, current or complete. The State of New South Wales (including the NSW Department of Planning, Industry and Environment), the author and the publisher take no responsibility, and will accept no liability, for the accuracy, currency, reliability or correctness of any information included in the document (including material provided by third parties). Readers should make their own inquiries and rely on their own advice when making decisions related to material contained in this publication.

DOCUMENT CONTROL

CM9 reference	DOC19/1005687
Mine safety reference	SB19-16
Date published	20 November 2019
Authorised by	Chief Inspector Office of the Chief Inspector