

SUDBURY INTEGRATED NICKEL OPERATIONS

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Challenge Title: Mining Hoist Rope Cable Visual Inspection

Challenge Issued for Glencore Sudbury Integrated Nickel Operations and participating mine operators: Vale Base Metals, Nutrien, and BHP. Challenge Issued by: MICA Network Challenge Iaunch date: September 9, 2024 Challenge close date: October 9, 2024

The Challenge

In Ontario, the required visual inspection for hoist ropes necessitates taking the hoist offline and manually inspecting the rope. This process is slow and conducted visually by a technician.

The average visual inspection can take anywhere from 20 minutes to an hour. It could take longer, but only when non-conformances are recorded. During which, the hoist remains offline, causing downtime and operational delays.

Glencore INO seeks a technological solution that can perform real-time visual inspections of hoist ropes during daily operations at full operational speed or at least within the scheduled inspection timeframe.

There is no prescribed speed for performing a visual inspection, and the inspector must be experienced and have high concentration and visual acuity. Despite the inspector's best efforts, human visual inspections are inconsistent at detecting non-conformances because of human factors, robe lubrication masking defects, rope speed, visual inspection vantage point, etc. Consequently, regulations are in place that require periodic Electromagnetic (EM) rope inspection.

This EM inspection requires a trained technician (generally performed by third parties) to clamp a device around the rope and pass the entire rope through the device so it can look for broken strands, rope diameter changes, etc. The technician will interpret the results of the EM scan and provide the hoist plant owner with a report on the rope condition.

Context and Background

Manual visual inspections of hoist ropes are time-consuming and can miss nuanced defects, leading to potential safety issues, reactive maintenance, and extended downtime. Given the





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crucial role of hoist ropes in mining operations, ensuring their integrity is vital. Glencore INO is looking for real-time visual rope inspection technology to replace manual inspections.

Problem Definition

Manual inspections are prone to missing subtle issues, which can lead to being more reactive in rope maintenance and repair. This process is time-consuming and requires external expertise to interpret the results, leading to further loss of productive hoisting time.

Scope and Scalability

Applicable to 3 sites at Glencore INO. The total length of rope to be inspected daily is 4800 feet.

Inspection Challenges and Considerations

According to the attached Visual Mining Rope Inspection Overview, the following are factors that inspectors look for to determine whether the rope should be condemned or require further investigation:

- 1. Rope Distortion: Issues like kinking, crushing, un-stranding, bird-caging, strand displacement, core protrusion, high stranding, and looped wires.
- 2. Broken Wires and Strands: Including their distribution and the period they occur.
- 3. Diameter Reduction: Due to abrasion, corrosion, core failure, or inner wire breakage.
- 4. Uniform rope lubrication: A bare spot on the rope may lead to corrosion and premature failure.
- 5. Corrosion: Especially near end terminations, which may not be immediately visible.

Certain areas, such as the "dead spots" (near the rope ends), may still require manual visual inspections.

Solution Requirements

The proposed solution should:

- Enable real-time visual inspection during normal hoist operation.
 - The hoist speed can be up to 18.5 m/s.
- Detect and report on rope distortions, broken wires, corrosion, rope lubrication, and diameter reductions.





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- Provide accurate data to detect non-conformances and predict and prevent potential failures.
- Be scalable to inspect all typical hoist rope diameters (generally between 35 to 45 mm) at Glencore INO.

Conclusion

This challenge invites innovative solutions to improve the efficiency and reliability of hoist rope inspections, ultimately enhancing safety and operational uptime in mining operations. The successful technology will revolutionize manual inspection, offering real-time insights and reducing downtime.

