

## Vale Mining Technology and Innovation

### Marking Bootlegs

Rock Bursts are challenges which are continuing since decades and have led to the loss of life, hampered production continuity and impacted many across the industry. In response to these challenges and as pro-active proponents of delivering social, stakeholder and stockholder value, Vale has undertaken efforts to better understand the causes of hazard and potential solutions around eliminating operating hazards in the mining cycle and is compelled to re-examine current practices and take stronger steps to achieve a zero-harm safety goal.

### Context and Background

A “bootleg” is the common term used to refer to remnants of a blasted drill hole typically from drilling and blasting in the drift development cycle. A remnant can either be a remaining drill hole portion that did not fully break when the blast was initiated ([Mine Reg. 2018](#)) or the trace of the hole end that is left on the face in the case of a fully blasted drill hole. All bootlegs must be checked prior to the drift face being prepared. The face is to be prepared and marked up before drilling commences (Vale All Mines Requirements, 2023). All remnants of blasted holes shall be conspicuously marked by, (a) a ring of contrasting paint or crayon; and (b) inserting sticks or plugs into the holes for lifter remnants in a heading (Revised Regulations of Ontario 1990, Reg. 854, s. 136 (3)).

Inspecting and marking bootlegs is a task that requires close proximity to the supported face and is therefore considered a high exposure task. The proximity to the face while completing this task inherently increases exposure to seismic activity and ground falls in the vicinity.



**Figure 1:** Example of marking bootlegs on face with red paint.

Source: [http://www.iring.ca/Knowledgebase/module\\_5\\_5\\_2.html](http://www.iring.ca/Knowledgebase/module_5_5_2.html)

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## **Problem definition**

This problem is focused on the inspection and marking of bootlegs. There is currently no commercialized solution without an Operator approaching the face to complete these tasks. Further investigation and investment are required to bring a solution to market for the inspection and marking of bootlegs.

## **Scope and Scalability**

Potential adoption at ~7 Operations

## **Solution Parameter Requirements**

- Inspect and mark bootlegs with red paint without requiring the Operator to enter the high-risk zone (horizontal distance from the face that is equivalent to the drift height). • Have capabilities for automation/ tele-remote operation.
  - The solution should autonomously operate or enable the Operator to teleoperate from outside the high-risk zone and should have similar dexterity to human capabilities in inspecting and marking bootlegs.
- Easy mounting and installation.
- Low maintenance.
- Standalone unit or enable the ability to be mounted on OEM buggy/carrier. • Low training requirements.
- Option to operate without LTE.