

# Enhancing crusher safety in the mining industry: a technical overview

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## ABSTRACT

**Background:** In the mining industry, crusher-related incidents have led to 15 reported deaths in Australia, New Zealand, and the USA between 1998 and 2007<sup>1</sup>. The majority of these fatalities occurred during routine crusher maintenance tasks, including liner changes, toggle plate maintenance, addressing blocked crushers, nip point, guarding and restricted access.

**Objective:** This research aims to provide non-technical stakeholders with a technical overview of the risks associated with crusher maintenance and propose solutions to mitigate these risks.

**Method:** We identified safety devices that address these risks and conducted a survey comparing sites with and without these safety measures.

**Results:** The survey results demonstrate that the currently available safety solutions significantly reduce the identified risks. However, the adoption of these measures varies due to factors such as cost, familiarity, and decision-makers' understanding of the risks. For instance:

- **Toggle Falling Risk:** Hydraulic toggle system and flywheel slip system showed no incidents of broken toggles over ten and four years and such device are required for sites that have had toggle challenges but cost prohibitive for others.
- **Falling Object Risk:** Double toggle jaw crushers or specialised liners reduced the frequency of liner changes and the was toggle less likely to fail, double toggle cost prohibitive in a competitive bid situation & specialised liners are frequently used in abrasive sites.
- **Pinch Points Risk:**
  - The Hydranut & hydraulic head nut device eliminated pinch points and reduced labor-intensive bolt fastening, resulting in reported labour savings and OH&S benefits.
  - Direct drive cone crushers, removed the pinch point & reduced maintenance as well as removed maintenance risks of fire and machine failure. Sites familiar favour, sites unfamiliar are reluctant to try given familiarity and the additional capital.
- In-crusher platform improved ease of maintenance on large jaw crushers and is a requirement for those familiar

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<sup>1</sup> <https://www.resourcesregulator.nsw.gov.au/sites/default/files/documents/mdg-31-feeder-breakers-and-crusher-fatal-incidents.pdf>

- Blocked Chamber Risk: The use of Variable Speed Drives (VSD) and rock breakers reduced the need for manual clearing of crusher chambers, with sites that adopted these methods emphasising their importance and willing to invest in them.

Overall, our survey findings show that safety solutions effectively reduce identified risks, but their adoption varies based on factors like cost and familiarity.

Implications: This study underscores the importance of involving maintenance and safety staff in the ordering process, ideally in collaboration with design engineers and OEMs. Greater communication among internal stakeholders can lead to more proactive risk assessment and safer equipment operation.