



Mines Safety Bulletin No. 145

Subject: Uncontrolled movement and derailment of fixed cranes during storm wind events

Date: 01 June 2017

Background

In recent years there have been several incidents of fixed cranes running away during windy conditions. During these incidents, there was uncontrolled long-travel movement of the crane to the end of the runway and contact with the long-travel end stops.

The resulting impact with the long-travel end stops damaged the end stops, and caused the crane carriage to dislodge from the runway rails. Further use of the derailed crane could have resulted in a collapse of the crane.



Upper carriage (left) and lower carriage (right) of semi-gantry crane following a derailment.

Summary of hazard

During storm wind events fixed cranes and their associated structures are exposed to loading which may not have been considered in the design and construction or during the operation of the crane.

This can lead to overload of parts and loss of control of the crane or load which has the potential to cause injury to those in the vicinity.

Contributory factors

Based on wind runaway incident reports and classified plant registration reviews, inspectors have identified the following.

Design and communication of design specifications

- Crane's design not addressing all the requirements of Australian and New Zealand Standard AS/NZS 1170.2 *Structural design actions – wind actions*.
- Inadequate dissemination of design specifications by the designers of the crane, including validation that the manufacturer has understood the designer's specifications.

Safe systems of work

- The crane's system of work not addressing the crane's operating limits (e.g. crane operated in wind conditions exceeding design constraints).
- Crane operators not trained and assessed as competent for the type of crane to be used, including work to be performed and potential hazards of the operating environment.
- The storm-locking arrangement on the crane (where available) not utilised after each use or before a strong wind event.

Actions required

The following actions are recommended to reduce the potential for fixed crane runaways.

Design and communication of design specifications

- Designers of cranes must consider the expected wind loading (i.e. AS/NZS 1170.2) and issue design specifications that satisfy the required safety margins for both in-service and out-of-service wind speeds (e.g. sufficient counterweight for overturning, automatic braking and locking systems to prevent sliding)

Note: During the planning of the crane's design, parties must agree and record the operational requirements regarding the in-service wind speed.

- Designers must confirm that their design and drawings have been interpreted correctly by the manufacturer, so that the manufacturing (detailing) drawings are suitable for construction of the crane.

Construction and commissioning

- Manufacturers must verify all aspects of the design have been met:
 - provision of all relevant data required for the design of the runway girders (i.e. AS 1418.18 *Cranes, hoists and winches – crane runways and monorails*, Appendix A)
 - provisions for counterweights if specified
 - drives (which provide suitable braking effort), drive numbers and arrangement
 - suitability of the rail system, including alignment checks and condition.

Safe systems of work

- Employers are to implement a safe system of work to ensure the crane is operated within its design specifications.

Note: Address provisions for locking and/or braking devices and positioning of the crane during storm wind events. Utilise suitable wind-speed monitoring systems where specified.

- Managers and supervisors are to:
 - provide workers with adequate instruction, training, assessment and supervision to operate fixed plant cranes
 - frequently inspect and suitably test critical equipment (not limited to brakes, electrical controls and drives) using competent person(s)
 - ensure modifications to a crane are assessed by competent person(s) to confirm conformance with Australian standards.

Further information

- Standards Australia, www.standards.org.au

AS 1418.1 Cranes, hoists and winches – general requirements

AS 1418.3 Cranes (including hoists and winches) – bridge, gantry and portal cranes (including container cranes)

AS 1418.18 Cranes, hoists and winches – crane runways and monorails

AS/NZS 1170.2 Structural design actions – wind actions

AS 2550.1 Cranes, hoists and winches – safe use – general requirements

AS 2550.3 Cranes, hoists and winches – safe use – bridge, gantry, portal (including container cranes), jib and monorail cranes

- Department of Mines and Petroleum, Guides and procedures, www.dmp.wa.gov.au/Safety/Guides-and-procedures-16202.aspx

Evaluation of asset integrity management system (AIMS) – guide

Note: Although issued for petroleum operations, this guide has general application to the mining industry.

This Mines Safety Bulletin was approved for release by the State Mining Engineer on 01 June 2017