Mines Safety Bulletin No. 134

Subject: Overloading of bridge and gantry cranes

Date: 02 November 2016

Background

There have been several bridge and gantry crane incidents reported to the Department involving loading of a crane beyond its rated capacity. In two recent incidents, a crusher bowl (still partially attached to the supporting structure) was being lifted by a semi-gantry crane to allow the bowl to be rotated out of its support using hydraulic powered equipment.

In the first incident, there was a catastrophic failure of the hoisting rope.

In the second incident, the load limiting system (i.e. weight overload protection system) did not stop hoisting when the rated capacity of the crane was exceeded. The load display unit indicated that the hoisting load had reached around 140% of the rated capacity before the emergency stop was manually activated by the crane operator.

Summary of hazard

Operating any crane beyond its rated capacity has the potential to cause a catastrophic failure of the crane, its support structure or both due to associated loss of control of the load.

When control of the load is lost, workers on or near the crane may be exposed to harm.

Contributory factors

Work practices

- Inadequate assessment of the mass to be lifted prior to attempting the lift.
- Inability to determine the mass due to the load not being free for hoisting.

Design and construction

- Failure to disseminate adequate information on the load limiting system by designers, manufacturers, importers or suppliers of the crane.
- Inadequate design, construction and installation of the crane allowing load limiting systems to operate at environmental conditions above the manufacturer's recommended ratings (e.g. high operating temperatures).
- Inadequate fail-to-safe design and construction of the load limiting system (e.g. malfunction of load limiting device and associated electronic components could result in a loss of load control).
- Ineffective load display and warning devices when the load approaches or exceeds the rated capacity of the crane.

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Commissioning and maintenance

- No calibration or incorrect calibration of load cells, load limiting and load display devices.
- Failure to perform functional testing of the load limiting device and its controls.
- Inadequate logging of service history data for preventative maintenance.

Actions required

The following actions are recommended for the safe operation of bridge and gantry cranes and to reduce the risk of harm to workers.

Work practices

- Use relevant guidance regarding lift planning (Australian Standards AS 2550.1 and AS 2550.3) – and perform a risk assessment for site-specific hazards not covered by these standards – to avoid loading a crane in an unsafe manner.
- Conduct a test lift when necessary, to ensure that the load is free, ready for hoisting, the winching system is operating correctly and the hoist brake can hold the load.

Design and construction

- Designers, manufacturers, importers or suppliers of crane must provide adequate information regarding the specifications and testing of all safety devices, when the crane is supplied and subsequently whenever requested [section 14(1), *Mines Safety and Inspection Act 1994*].
- All safety devices, including the load limiting device and associated electrical components, should be rated for the environmental operating conditions to which they are likely to be exposed.
- The load limiting system should be fail-safe (e.g. the crane will stop hoisting or move in a way that will not cause overload or failure).
- Load display and warning devices should be fitted to the crane to indicate the actual loading and alert the operator when an overload condition is approached, reached or exceeded.

Commissioning

- Correctly calibrate and function test load cells, load limiting and load display devices.
- A classified plant inspector must confirm that all safety devices, including the load limiting system, have been correctly calibrated and functionally tested for their operation and test records have been signed.
- The load limiting device should be set to operate so that the safe working capacity of the crane is never exceeded.

Maintenance

- Review preventative maintenance systems for routine inspection, assessment and functional testing of all safety devices, including the load limiting system and load display device.
- Monitor and record actual service conditions, such as hours of operation and number of operating cycles (i.e. the design working period), that should trigger preventative maintenance.

Further information

- Standards Australia, www.standards.org.au

AS 1418.1 *Crane, hoists and winches – General requirements*

AS 1418.3 *Crane, hoists and winches – Bridge, gantry, portal (including container cranes) and jib cranes*

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*

AS 2549 *Cranes (including hoists and winches) – Glossary of terms*

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