

Safety Alert

Mines Inspectorate—All mines

Safety Alert No. 282 | 20 January 2012

Catastrophic structural failure of excavator boom

What happened?

While loading material onto a dump truck, a Hitachi Zaxis 450H Excavator boom fractured, causing the boom to bend along the bottom plate and fall onto the tray of the truck (as pictured).

Why did it happen?

Undetected cracks had spread at welded joints in a high-stress area of the excavator boom. Points to note are:

- This 2003 excavator had completed nearly 12 000 hours' service.
- On dry hire to the mine, it had been at the site for several weeks, loading mined material into dump trucks. While the mine's cursory pre-acceptance checks had failed to detect cracks or signs of impending failure, rust in the failed area indicated that cracks must have been present for sometime before the excavator arrived on site.
- Maintenance records and service/usage history for the excavator were not available.
- There is some evidence the excavator had been previously used with a hammer attachment.
- Recently, cracks were found near the same area on another Hitachi 450 excavator with about 11 000 hours of service.



Original equipment manufacturers (OEMs) usually recommend, for small to medium excavators (up to 100 tonne), front-attachment inspections limited to visual checks for damage and cracks. For larger excavators, OEMs provide guidance on inspection methods, including on areas more likely to fail.

Recommendations

To ensure structural integrity of booms, arms and auxiliary equipment (bucket pins, attachment points etc.) on small to medium sized excavators and shovels:

1. Site Senior Executives (SSEs) should consult with OEMs to develop and implement periodic maintenance inspection procedures, with an appropriate mix of visual, liquid penetrant and magnetic particle examinations. Account for duty where components may face increased cyclic fatigue, shock loads and vibration (e.g. prolonged use with hammer attachments).
2. Meanwhile, SSEs should arrange regular, thorough visual examinations to detect any cracks or damage and to tag faulty equipment as 'out of service'. Ensure repairs or replacements before operating the equipment again and ensure all inspections, assessments, repairs and replacements are performed by appropriately competent personnel in conjunction with technical advice from the OEM.
3. SSEs should review the process for verifying the condition of used equipment brought to site, including checks on maintenance history, past usage and evidence of inspections conducted on booms, arms and auxiliary equipment.

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