

## Sheared Bolts Discovered on JLG Aerial Lift Boom Connections to Platform after Physical Inspection

**Priority Descriptor:** Yellow /Caution

**Lesson ID:** 2012-BNL-Aerial-0001

**Originator:** Brookhaven National Laboratory

**Date:** July 30, 2012



**Statement:** A JLG model 860SJ aerial lift was found to have all eight of its platform rotator attachment bolts sheared in half. This condition is not obvious during a visual inspection. Although there was no risk of the platform detaching from the boom the horizontal rotation capacity of the platform was severely compromised.

**Discussion:** On July 26, 2012, at Brookhaven National Laboratory (BNL), a contractor working on building siding outside of the National Synchrotron Light Source-II (NSLS-II) construction project was operating a leased JLG 860SJ Boom Lift and was approximately six feet off the ground when he began having difficulty in articulating the basket (platform). A DOE inspector in the area asked him to lower the basket to the ground to investigate. A NSLS-II Construction Safety Engineer in the area who had knowledge of similar issues with this type of lift examined the eight (8) 3/8-inch platform-rotator attachment bolts that surround the main center pin that holds the basket to the boom. These bolts are installed vertically, down through the platform support and threaded into the rotator's hydraulic motor, therefore all eight bolt heads appeared visually intact as expected. However, it was discovered that all eight bolts were completely sheared when the tops were able to be removed by hand. The separate center pin is the load bearing structure for the basket to boom connection; this connection was sound.

All Aerial Lift activity was suspended and notifications were made to all users on site to perform necessary physical inspections before use. Inspection of site Boom Lifts (by the vendor) has been completed. Other lifts have been found with similar problems. Affected Boom Lifts have been taken out of service and those lifts found acceptable were placed back into service.

**Analysis:** Failure of all platform-rotator attachment bolts does not result in detachment of the work basket from the boom assembly, but in lateral disengagement between the rotator power source and the work platform.

Initial inspection of the failed bolts noted that corrosion had formed on the failed surface of six (6) bolts indicating that these failures occurred sometime in the past.

The lift manufacturer has stated that these bolts can fail if they experience excessive force or contact between the platform and another object or structure and should be checked as part of manufacturer's recommended inspections.

Note that friction may continue to allow horizontal rotation of the basket even if all bolts are sheared but the operator should notice a lack of normal response of the equipment.

A review of the DOE Lessons Learned database cites a similar condition discovered on July 23, 2007: Lesson ID: Y-2007-OR-BJCPQA-0701, Sheared Bolts Discovered on JLG aerial lifts model 860SJ. In that incident a plastic environmental protective cover needed to be lifted up to properly see and check the bolts.

**Actions/Recommendations:**

- Temporarily take all aerial lifts JLG model 860SJ out of service until they can be inspected.
- Physically inspect the eight (8) 3/8-inch platform-rotator attachment bolts that surround the main center pin that holds the basket to the boom. If necessary raise the environmental protective cover.
- Visual inspections are not sufficient because the bolts are oriented vertically and appear intact.
- Follow the manufacturer's guidance for inspections but it is recommended to examine the bolts prior to each use particularly if the basket struck an object or was subjected to an external lateral force.

**References:** ORPS Report SC--BHSO-BNL-BNL-2012-0024

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## Attachment

### Photos JLG Model 860SJ Aerial Lift



JLG Model 860SJ Aerial Lift



Eight bolts as they should be surrounding the main man lift bucket attachment bolt.

Note the orientation of this attachment point of the bucket to the boom is horizontal.



Remains of the eight sheared bolts after the tops were lifted out of the holes.



Tops of the sheared bolts.