



Department of Industry and Resources

Safety and Health Division

Significant incident report No. 133

Use of torque multiplier — fatal accident

Incident

A 4th year apprentice fitter, employed by the agent of an original equipment manufacturer (OEM) supplying mobile mining equipment, suffered a serious head injury that subsequently resulted in his death after he was struck by a torque wrench. This occurred when he was manually torquing up a suspension cylinder retaining bolt on a Caterpillar 785B Haul Truck. The apprentice was using a ½" drive 250 pound-foot tension wrench fitted to a Caterpillar model 6V6080 manually operated torque multiplier.

The torque multiplier has a detachable reaction arm that is used to anchor the torque multiplier to a suitable point to prevent it from counter rotating when torque is applied to it; in this instance, via the tension wrench. The original torque reaction tube is 358 mm in length, 47 mm in outside diameter and 40 mm in internal diameter. At the time of the incident, the tube had been extended by means of inserting a hexagonal 30 mm x 1752 mm steel crow bar inside the original torque reaction tube and resting it on top of the front bumper bar of the truck.

At the time of the accident, the apprentice fitter was standing on a steel bench and was applying torque to the tension wrench through the torque multiplier using an upward pulling action from knee level to waist height. Very soon after attaining the desired tension the apprentice fitter lost control of the torque wrench, which spun around and struck him on the head.

Contributory factors

- A job safety analysis (JSA) completed prior to the accident did not identify the hazards associated with applying torque using a torque multiplier.
- The torque multiplier reaction arm was extended with the use of a spring steel crowbar.
- No reference was made to the workshop manual or torque multiplier safety instructions regarding the possible hazards prior to the accident.
- The instructions for the safe use of the torque multiplier were not included with the tool as supplied by the manufacturer, nor were they available on site at the time of the accident.
- The instructions for the safe use of the torque multiplier were not adhered to.
- Upon dismantling and inspection of the torque multiplier, it was evident that the internal locking mechanism had failed.
- The torque multiplier was not maintained or included on a preventative maintenance schedule.

Recommendations

- A comprehensive JSA should be conducted incorporating reference to the tool manufacturer's operating instructions and warnings.
- The tool operating instructions and warnings should accompany the tooling as supplied by the manufacturer.

- Non-genuine or additional torque reaction tubes should never be used without consultation or approval from the original tool manufacturer, as they can become a hidden source of stored energy.
- The JSA should include a requirement for additional personal protective equipment (PPE) such as a hard hat and gloves to be worn where practicable.
- Mine management and equipment manufactures and suppliers should review the requirement for the use of manually operated tooling and consider replacing it with electrical or pneumatic tooling and equipment in all maintenance functions.
- Tooling such as torque multipliers, tension wrenches and associated equipment that are subjected to high loads and frequent use should be placed on a register and be maintained as per the manufacturer's recommendations. In the absence of manufacturer's recommendation, an internal program should be developed for such equipment to be inspected and maintained.

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