

A 57 year old male employee was struck by a hook on an air powered bumper jack. The inspection was initiated due to an employer-reported referral of an employee being hospitalized after being found in the mechanic shop with severe facial and head injuries; the source of these injuries was not immediately apparent to co-workers nor county safety personnel. The victim sustained a 7mm left to right midline brain shift, bilateral orbital fractures (eyes), occipital bone fracture (rear of the skull), sphenoid bone (skull bone near the temple), and sphenoid sinus fractures.

The victim was supposedly sweeping the shop in preparation for welding a support bracket on a trailer that would be brought into the shop later. The floor was partially swept, a broom was found leaning against a shelf, and three bumper jacks were in the vicinity of the body with one attached to an air supply and overturned. No other equipment or items were found out of place or around the body when the victim was discovered. There was an approximate gap of 50 minutes between when the victim was last seen and when he was discovered with the sustained injuries. The victim was also in the proximity of a stored ladder (noted in the police report) and an overhead storage area approximately 8 feet above the lower level. A rolling desk chair was in front of the stored of the scene, but no evidence was found that indicated the victim had climbed that ladder or had accessed the upper storage area.

A Strongway air bumper jack was found in close proximity to the body, almost fully extended based on photos from the scene, and toppled over with the air hose draped over the top of the victim's body. It was discovered through interviews and research that the jack had been modified from its factory configuration, with chains and hooks supplemented to the lifting bar. The modification created a hazard where the added hooks would get caught on the base frame of the jack, but normally an employee would realize what had happened and would release the pressure. However, this created a dangerous condition where the jack was under pressure to lift but was stuck on its own frame. Based on the evidence at the scene, medical documentation of the sustained injuries, and the timeline, it is plausible to think that the victim was sweeping the shop and either wanted to sit and rest on the jack (co-workers said he did this from time to time), or he was attempting to move the jack. In any case, it is possible that the victim attempted to raise the jack, but a hook was caught on the frame. According to interviews, a hook being caught on the frame was not uncommon. When the victim moved his head to look or possibly pressed the button to raise the jack again, the jack suddenly let go from the edge of the frame, creating the upward deformation found on the jack's frame that fell in line with the corresponding hook on the left side when facing the jack. This force would have been sufficient to strike the victim with the top metal cylinder of the jack, striking him in the face, and causing him to fall straight back where he hit the back of his skull on the concrete floor. This explains the laceration to the lip, broken eye sockets, and massive facial trauma, along with the fractures to the back of the victim's skull. It also is likely that the jack would have turned away from him and the air hose would come to rest on top of his body, which is the position he was discovered in.

A proof-of-concept test was conducted by the Knox County Schools Safety Director. All personnel were removed from the shop and the jack was activated remotely via a breaker that operated the compressor. A wooden dowel was used to hold the hooks under the frame, simulating a condition where the hook would be caught on the frame. After an amount of time where the pressure was sufficient to break the wooden dowel, the jack broke the object and shot upwards with enough force to come off the ground several inches, despite weighing 195 pounds. This indicates that it is plausible to assume that the hooks on the jack could become hung on the frame and could potentially release enough stored energy to cause the injuries sustained by the victim. This, along with the deformation in the frame directly in line with the hook, makes it the most likely scenario for what occurred to cause the damage to the victim.

Citation(s) as Originally Issued

A complete inspection was conducted at the accident scene. Some of the items cited may not directly relate to the fatality.

Violation 1 Item 1

Type of Violation: Serious

\$0

TCA 50-3-105(1): Each employer did not furnish to each of its employees, conditions of employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious injury or harm to its employees:

In that employees were exposed to a struck-by hazard while using one of three modified Strong-way air-powered bumper jacks found in the mechanic shop that utilized chains and hooks hanging from the support structure to lift a load instead of the stock rubber pads that pushed a load upwards. This modification exposed employees to a struck-by hazard when a hook catches on the frame, allowing for a sudden release of stored energy.



Struck By bumper jack hook—Insp # 1672738 Knox County-Schools Maintenance

