

New Jersey Law Journal

Can Worker Behavior Be the Cause? How workplace pressure can lead to serious injury

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Falls are the fourth leading cause of serious workplace injuries and falls from ladders account for a large portion of these injuries. In 2010, there were 129 fatalities caused by workers falling from a ladder and 14,710 injuries that required at least one lost day of work.

Epidemiological research has shown that the majority of ladder falls occur while individuals are standing and working on a stepladder. Occupational Safety and Health Administration (OSHA) regulations and American National Standards Institute (ANSI) guidelines state that the worker should stand within the rails of the ladder to prevent him or her from falling and to keep the ladder from tipping over. Even though OSHA also regulates that employers provide training on the proper use of ladders, ladder falls still occur at a high frequency, and many are caused because workers reach too far, placing their center of mass beyond the ladder rail.

The following is a case study and analysis of a nonfatal ladder fall in which the worker was found lying next to a stepladder on a pile of construction debris. The stepladder did not exhibit any damage or defects and was still upright when co-workers came upon the injured individual. There were no eyewitnesses to the incident, but the worker claimed that the fall was caused by movement of the stepladder.

Case Facts

A 34-year-old male construction worker (5'4" and 185 pounds) was involved in a workplace ladder fall, according to the employer's incident report. The construction company that employed him was contracted to demolish and remove a three-story office building in Trenton, N.J.

Medical records indicate the worker was diagnosed with a comminuted fracture of the right humeral head and neck, and a right rotator-cuff tear reportedly resulting from the fall.

The worker testified that he was cutting through old metal water pipes that were hanging from the exposed ceiling of the second floor. He testified that he was working from a relatively new eight-foot fiberglass stepladder and was standing on the third rung from the top. He further testified that he was leaning against the ladder with his legs while cutting the pipes with a reciprocating saw. According to the worker, he was wearing construction work boots with reinforced toes and a hard hat at the time of the incident.

The pipes were suspended by hangers placed at a horizontal distance of eight feet from each other. He testified that he was cutting the pipe into approximate eight-foot lengths to coincide with the location of the hangers. Each cut took approximately 45-60 seconds, so the worker had to move the ladder frequently. He testified that while he was cutting a piece of pipe, the ladder shifted, causing him to lose his balance and fall. Co-workers found him on top of construction debris to the right of the stepladder. The stepladder was upright in its original position, and the partially cut pipe was still suspended from the ceiling by the hanger. According to available information, the concrete floor was dry, and there were no pieces of pipe on the ground or in the pile of construction debris located next to the ladder.

The worker's supervisor testified that the worker was the only person tasked with removing all of the pipes and, at the time of the incident, there were no other workers or equipment in the immediate vicinity. He had been told to finish removing the pipes by the end of the day. Although a typical workday ended at 3:30 p.m., there were still dozens of pipes to be removed. According to the testimony of the supervisor, there were other workers performing different tasks, and construction debris was accumulating on the floor.

Standards and Regulations

According to the supervisor's testimony, the construction worker had completed the necessary training to obtain an OSHA 10-hour construction card and participated in weekly toolbox talks

that included training on the safe use of ladders. This training was in accordance with OSHA 1926.1060(a), which states that the employer shall provide a training program for each employee using ladders and stairways, as necessary. The program shall enable each employee to recognize hazards related to ladders and stairways and shall train each employee in the procedures to be followed to minimize these hazards. One of the potential hazards encountered while working on a ladder, as stipulated by 1926.1053(b) (9), is the presence of debris or other objects located at the bottom of the ladder. ANSI A14.5-2007, produced by the American National Standards Institute, states that portable ladders are not designed for excessive side loading and that such abuse of the ladder shall be avoided. The ladder shall be kept close to the work. The user shall not overreach, but shall descend and relocate the ladder instead. When using a ladder, the user shall never push or pull unless the ladder is properly secured.

Analysis

An inspection of the stepladder revealed there were no defects or damage after the subject incident. The ladder was of an appropriate height for the performance of the task in accordance with the standards of best practices and training the worker had been provided. The removal of dozens of lengths of pipe during the day of the subject incident is an example of the successful completion of similar tasks.

The worker testified he was wearing appropriate personal protective equipment and, according to witness testimony, there were no lengths of pipe located in the vicinity of the ladder. The pipe being cut at the time of the subject incident was still secured to the ceiling by a hanger. Furthermore, the available testimony indicated that there was no additional equipment being used in the area that may have struck the worker or ladder and there was no water or other contaminant present that could have made the ladder or the floor surface slippery.

The subject incident occurred with just over an hour left in the typical workday. A co-worker testified that the construction worker commented to him that he felt rushed, because he was not sure he could remove all the pipes before the end of the day. Witnesses noted there was demolition debris on the floor surface underneath the pipe that the worker was in the process of cutting. In fact, he was found lying on construction debris.

Even though reaching guidelines are typically included in training programs, such as the OSHA 10-hour construction training, workers still overreach. Research has shown that even with proper training, workers are influenced by many factors and may determine that the additional risk of overreaching is warranted. Research performed by the co-author at the Liberty Mutual Research Institute for Safety in Hopkinton, Mass., evaluated the maximum lateral reach distance for experienced ladder users while working on a stepladder. Participants in the experiment reached farther than their initial maximum lateral reach distance (approximately two inches on average) when motivated to do so by a concrete task and the belief that reaching farther would allow them to complete the experiment more quickly. If a participant was unable to complete a reaching task, the individual was instructed to descend the ladder and perform a task to simulate the time required

to reposition the ladder. Many participants in the experiment lifted their opposite leg off of the stepladder in an effort to reach farther and complete the task, even though it was more difficult for them to maintain balance. [See Figure 1.]

Task completion time is very important on the jobsite, especially when it is prioritized over safety as dictated by co-workers and management. According to the supervisor's testimony and witness statements, the worker felt a time pressure to complete the pipe removal.



Figure 1. A demonstration of an individual lifting his leg off of a stepladder in order to reach farther.

After considering the possible scenarios and factors related to the subject incident, such as the worker's medical conditions and anthropometry, personal protective equipment, environmental conditions and ladder condition, it is probable that the worker did not take the time to move the debris so that he could place the ladder in the proper location. He placed the stepladder next to the debris, instead, which placed him approximately three feet to the left of the cutting location. In order to reach the pipe that needed to be cut, the worker, while holding a reciprocating saw, had to reach to his right. Given his height of 5'4", he likely lifted his left leg off of the ladder in order to gain more of a reach distance and lost his balance while using the reciprocating saw.

Under New Jersey law, the injured worker would most likely file a complaint against the ladder manufacturer pursuant to New Jersey's Products Liability Act, N.J.S.A. 2A:58C-1 through 7, alleging that the ladder caused his injuries under the theory of strict liability and/or negligence. Under this theory, the manufacturer of the ladder has a duty to make/sell a ladder that is reasonably safe, fit and suitable for its intended purpose. In this case, the injured worker could argue that the ladder was not fit for its intended purpose because of: (a) a manufacturing defect; (b) a failure to adequately warn or instruct; or (c) a design defect. Regardless of the injured worker's theory of liability against the ladder manufacturer, under the facts presented, the injured worker has to overcome the hurdle of "comparative negligence." If the injured worker and the manufacturer are both found to be partially at fault (or the proximate cause) for the accident/injury, then a jury must

compare their fault in terms of percentages. In New Jersey, if the injured worker's fault is greater than that of the manufacturer, the manufacturer "wins."

Generally, this defense is not available in cases of workplace injury but is available where the worker deliberately and knowingly acted in such a way as to create or materially increase a risk of injury. The seminal case on employee comparative negligence is *Suter v. San Angelo Foundry & Machine Company*, 81 N.J. 151 (1979). Later cases clarified *Suter* and held that, based upon the injured worker's behavior and knowledge of specific dangers associated with the product, a jury could consider the negligence of the injured worker. See, generally, *Butler v. PPG Industries*, 201 N.J. Super.558 (App. Div. 1985), and *Cavanaugh v. Skil Corp.*, 231 N.J. Super.134 (App. Div. 1999), aff'd 164 N.J. 1 (2000).

Summary/Conclusions

Based upon the available information, it was determined within a reasonable degree of scientific certainty that:

1. A 34-year-old male construction worker was involved in a workplace ladder fall while removing pipes from the ceiling of a building being demolished in Trenton, N.J.
2. The construction worker landed on a pile of construction debris, fracturing his right humerus and tearing his right rotator cuff.
3. The stepladder involved was not defective or damaged and was the appropriate height.
4. The construction worker had obtained an OSHA 10-hour construction safety card and additional safety training from his employer.
5. The testimony of the construction worker places him on the third rung from the top of the ladder holding a reciprocating saw and reaching to his right approximately three feet to cut a pipe.
6. By his own admission, the construction worker felt rushed to complete the job.
7. As a result of his overreaching, the construction worker lost his balance and fell to the floor, leaving the ladder upright in its original position.
8. The construction worker's injuries were the direct result of his improper actions while using a stepladder.

Thus, because the worker's improper actions were the proximate cause of his injuries in this scenario, he would not be able to recover against the manufacturer of the stepladder.■

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