

Seventeen-Year-Old Laborer at Salvage Lumber Operation Crushed by Forklift That Tipped Over – New York

NIOSH In-house FACE Report 2000-22

Summary

On July 10, 2000, a 17-year-old laborer (the victim) working at a salvage lumber operation was fatally injured when the sit-down type forklift he was operating overturned. The youth had been asked to move the forklift from the lumber storage area to the re saw area when he returned to work from break. He had offered a ride to a coworker who was also returning to work. She had accepted and was riding on the right side of the forklift, holding onto the overhead guard. They had traveled about 135 feet when the victim turned sharply to the left, and the forklift tipped and overturned to the right ([Photo 1](#)). The coworker jumped from the machine while the victim was thrown or jumped from the operator's seat. The victim's head was caught between the overhead guard and the ground while the coworker's ankle was pinned. Other workers heard screams and went to the forklift. They raised the machine to free the coworker and pulled the victim from under the overhead guard. Emergency personnel were notified and arrived within 15 minutes. The victim was transported to a local emergency room where he was pronounced dead. The coworker was transported to a local emergency room where she was treated for minor ankle injuries and released.

NIOSH investigators concluded that, to help prevent similar occurrences, employers should:

- ensure that forklifts are operated by employees who have been specifically trained to use safe operating procedures and to recognize the hazards of improper operation
- ensure that sit-down type forklifts are equipped with adequate operator restraint systems to protect the workers in the event of a tip over
- ensure that riders are not allowed on forklifts unless the machines are specifically designed to safely accommodate passengers
- establish work policies that comply with child labor laws prohibiting youths less than 18 years of age from operating power-driven hoisting equipment, including forklifts

Introduction

On July 11, 2000, a 17-year-old male laborer (the victim) was fatally injured when the forklift he was operating tipped over and he was crushed by the overhead guard. A 19-year-old female laborer who was riding as a passenger was also caught under the overhead guard and suffered minor ankle injuries. On July 13, 2000, the Division of Safety Research (DSR) learned of the incident from a newspaper clipping service. Additional information was received from the U.S. Department of Labor, Wage and Hour Division, on July 26, 2000. On August 29, 2000, a DSR safety engineer met with a representative of the U.S. Occupational Safety and Health Administration (OSHA) to discuss their findings and review the case file. The case was also discussed with the U.S. Department of Labor Wage and Hour investigator. On August 30, 2000, the safety engineer interviewed the employer at the salvage lumber yard, observed the operation, and examined the forklift.

The employer was a small salvage lumber company that specialized in manufacturing antique flooring from salvaged framing timbers. The company had been in business for about 1½ years before the incident. The size of the workforce varied, depending upon the amount of material to be processed, with no more than 10 employees at any given time. At the time of the incident, three of the employees were less than 18 years of age. The company owner traveled throughout several adjoining states purchasing framing timber from demolished structures, primarily old barns. These timbers were then shipped to the employer's sawmill operation. Upon delivery to the sawmill facility, old nails and other embedded metallic objects were removed from the timbers, which were then sawed into boards using a portable band saw. The boards were then run through a planer for surfacing and machining of the tongue-and-groove edges for use as flooring. The boards were transported to and from the re saw area and planer using the sit-down type forklift. Safety policies and training were unwritten with training conducted on the job by the owner or experienced adult workers. The victim had been working for about 1 month prior to the incident. His normal duties consisted of removing nails and embedded metal objects from the timbers and manually stacking rough and finished lumber. In addition, he had been shown the operation of the forklift controls and assigned to operate the forklift. The victim had recently completed the 11th grade at a local high school where he had been enrolled in a vocational technical program studying heavy equipment operation. The course syllabus for heavy equipment operation covered principles of operation and basic maintenance procedures for construction and excavation equipment including wheel tractors, crawler tractors, hydraulic hoes and excavators. Forklift operation was not included in the course syllabus. He possessed a valid state-issued driver's license.

This was the company's first fatality.

[Back to Top](#)

Investigation

On July 11, 2000, the victim, along with six other workers, started working at about 8 a.m. At about 10 a.m., work was suspended for a 15-minute break. The victim and a female coworker stayed on break a little after the rest of the workers. As they were returning to work the victim asked the coworker if she would like a ride to the work area. The victim had been asked to bring an unloaded sit-down type forklift which was located near the break area to the re saw area. The coworker intended to continue her work in the de nailing area which was directly adjacent to the re saw area. She accepted the offer of a ride and the two boarded the forklift. The victim was seated at the operating controls while the coworker rode on the right side of the machine, holding onto the overhead guard. As the two traveled to the work area with the forks about 1 foot above the ground, the victim jokingly told his coworker that he was going to flip the machine. The victim drove the forklift east for about 135 feet over the hard packed dirt roadway. According to the coworker, as the forklift approached the re saw area, the victim sped up and abruptly turned to the left. As he did so, the forklift became unstable and began to tip to the right. The coworker jumped off to the right as the forklift continued to tip. The victim was either thrown from the machine or also jumped to the right. The machine tipped over, trapping both workers between the overhead guard and the ground. The coworker's ankle was caught under the overhead guard, whereas the victim's head was caught under the overhead guard. The coworker screamed for help, and other workers came to assist. They were able to lift the forklift high enough to remove both workers. The lead worker sent another worker to call 911. Emergency personnel responded within 15 minutes. Both workers were taken to local hospitals. The victim died of his injuries about 1 hour after the incident. The coworker was treated for minor ankle injuries and released the same day.

The forklift was a 1964 Tow motor that the owner had purchased at auction about 9 months before the incident. It was equipped with outdoor-type tires, had a wheelbase of 50 inches, a 43-inch track, and a height of 47 inches from the ground to the operator's seat. The machine was steered by the rear wheels and powered by the front wheels. Power was transmitted from the engine to the drive wheels through a disc-type clutch, gear box, and open differential. The gearbox provided forward and reverse directions and high and low speed ranges. Each drive wheel was equipped with a mechanical braking assembly. According to the owner, all employees operating the forklift had been instructed to operate in the low-speed range only.

The machine was equipped with an overhead guard to protect the operator from contact with falling objects; however, it had not been equipped with an operator restraint system.

[Back to Top](#)

Cause of Death

The county medical examiner determined the cause of death to be severe blunt trauma to the head.

Recommendations and Discussion

Recommendation #1: Employers should ensure that forklifts are operated by employees who have been specifically trained to use safe operating procedures and to recognize the hazards of improper operation.

Discussion: Because the victim had a valid state-issued driver's license and had studied heavy equipment operation in school, the company owner decided to assign him to occasionally operate the forklift. The operating controls of a forklift are uncomplicated and similar to those of an automobile; however, the vehicle's response to control inputs, especially steering, can be decidedly different. A forklift's narrow track and short wheelbase result in the machine's having a higher center of gravity than the typical automobile. Because of this, a forklift may overturn much more easily than an automobile and at much lower speeds. Additionally, the added weight of a rider on the right side of the machine could significantly decrease its resistance to overturning while negotiating a left-hand turn.

Although the victim had studied heavy equipment operation in school, forklift operation was not included in the course syllabus. Before being authorized to operate mobile equipment such as forklifts, workers should be trained to recognize the operating characteristics of the vehicle and to understand and demonstrate safe working procedures. This training should include, but not be limited to, recognition of forklift stability characteristics, safe operating speeds and maneuvers, and the need to prohibit the carrying of passengers when seating designed to safely accommodate passengers is not provided. Comprehensive training requirements for general industry are stipulated in Part 29 Code of Federal Regulations, 1910.178, Powered Industrial Trucks.¹ A NIOSH Alert, (NIOSH Pub. 2000-112) Preventing Injuries and Deaths of Workers Who Operate or Work Near Forklifts, provides additional recommendations for safe forklift operations.²

Recommendation #2: Employers should ensure that sit-down type forklifts are equipped with adequate operator restraint systems to protect the workers in the event of a tip over.

Discussion: The forklift involved in this incident, a 1964 Tow motor, was not equipped with an operator restraint system. The operator's seat was mounted on a heavy-gauge sheet-steel cover intended to be secured with bolts to the forklift's frame. However, the bolts for the steel cover were missing ([Photo 2](#)). According to the employer, this was the machine's condition when purchased at auction and he had assumed that it was acceptable for use. The machine was equipped with an overhead guard to protect an operator from being struck by falling material. During an overturn, the overhead guard is generally the part of the forklift that crushes the operator's head or torso after he or she falls or jumps outside of the operator's compartment. The risk of being crushed by the overhead guard or another rigid part of the forklift is greatly reduced if the operator remains restrained inside the operator's compartment. Since 1992, the American National Standards Institute has specified that forklift manufacturers equip new forklifts with operator restraint systems.³ Many forklift manufacturers offer restraint systems that can be retrofitted to older sit-down type machines. In the early 1970s the manufacturer of the forklift, Tow motor, ceased operations and was sold to Caterpillar Incorporated. During the investigation, it was learned that retrofit operator restraint systems are available for the forklift involved in the incident. Owners of Tow motor forklifts should contact their local Caterpillar Incorporated equipment distributor for assistance in obtaining retrofit operator restraint kits. Because many older forklifts are not equipped with a restraint system and operator compliance is less than 100% on forklifts equipped with a restraint system, operators of sit-down type forklifts should be instructed not to jump from the operator's compartment but to hold on, brace themselves, and lean in the opposite direction of the overturn. If the victim had been able to remain within the boundaries of the overhead guard, the severity of his injuries may have been reduced.

Recommendation #3: Employers should ensure that riders are not allowed on forklifts unless the machines are specifically designed to safely accommodate passengers.

Discussion: The forklift involved in this incident was equipped with an operator's seat adequate for one person, aside from the conditions noted in the preceding discussion. Safe seating was not provided for additional riders. Further, there was insufficient width for a rider to be completely seated on the machine, increasing the rider's risk for injury. The added weight of a passenger located outside of the forklift's track would significantly decrease the machine's ability to resist overturning while negotiating a turn to the left, a factor which may not have been fully understood by the victim.

Recommendation #4: Employers should establish work policies that comply with child labor laws prohibiting youths less than 18 years of age from operating power-driven hoisting equipment, including forklifts.

Discussion: The Fair Labor Standards Act (FLSA) prohibits employment of workers younger than age 18 in nonagricultural occupations which the Secretary of Labor has declared to be particularly hazardous. Hazardous Order (HO) No. 7 prohibits persons under the age of 18 years from operating power-driven hoisting apparatus including high-lift trucks (i.e., forklifts). The 17 Hazardous Orders are listed and explained by bulletin WH-1330, U.S. Department of Labor, Employment Standards Administration, Wage and Hour Division.⁴

The prohibitions of HO 7 are consistent with other child labor laws that address motor vehicle operation. Studies of adolescent drivers suggest that they often underestimate the risk of vehicle crash while simultaneously overestimating their own driving skill.⁵ It seems reasonable to assume that a similar situation may exist when youth are assigned to operate mobile machinery, such as forklifts. Youthful workers who lack experience may also have a diminished perception of risk and an exaggerated perception of their ability to control a hazardous situation. As noted in discussion of previous recommendations, inexperienced forklift operators may not fully appreciate the machine's unique operational characteristics unless specifically trained. Also, as stated earlier, the victim had jokingly told his coworker that he was going to flip the machine. Whether he actually intended to increase speed before attempting to negotiate the turn cannot be determined.

References

1. 29 CFR 1910.178 [1998]. Powered industrial truck operator training, Washington, DC: U.S. Government Printing Office, Office of Federal Register
2. NIOSH [1999]. NIOSH alert: preventing injuries and deaths of workers who operate or work near forklifts. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2000-112.
3. ASME, ANSI [1993]. Safety Standards for low lift and high lift trucks. American Society of Mechanical Engineers and American National Standards Institute, ASME B56.1- 1993.
4. DOL [1991]. Child labor requirements in nonagricultural occupations under the fair labor standards act. Washington, DC: U.S. Department of Labor, Employment Standards Administration, Wage and Hour Division, WH-1330.
5. Deery HA, [1999]. Hazard and risk perception among young novice drivers. Journal of Safety Research, Vol. 30, No.4, pp. 225-236.

[Back to Top](#)

Investigator Information

This investigation was conducted by Paul H. Moore, Safety Engineer, NIOSH Division of Safety Research, Surveillance and Field Investigation Branch, Fatality Assessment and Control Evaluation Team.

Photographs



Photo 1. Overturned Forklift.



Photo 2. Overturned Forklift – Unsecured Operator's Seat

The FACE investigation project is the cornerstone of the overall NIOSH program to prevent occupational fatalities. The objectives for this effort include the investigation of occupational fatalities to assess and characterize the circumstances of these events in order to develop succinct descriptive and evaluative reports for distribution to occupational safety and health groups across the country. This work is being conducted by the FACE investigation team. It is expected that the reports alone will have a major impact by better defining the causal factors behind occupational fatalities, calling national attention to the problem, and providing insights into the prevention efforts that are needed. However, the program does not determine fault or place blame on companies or individual workers.

[In-house Reports](#)