

MIFACE INVESTIGATION: #02MI028

SUBJECT: Rigger Killed When Equipment Being Unloaded From A Semi-Trailer Fell From the High-Lift Fork Truck and Landed on Him

Summary

On March 1, 2002, a 52-year old rigger died while he was assisting in the removal of a piece of metal framework weighing 1500-2500 pounds. The framework was located in the middle of an enclosed trailer bed. Approximately ½ of the trailer load was material on pallets and had been unloaded from the trailer with a high lift fork truck. The metal framework involved in this incident was free-standing, not on a pallet. The handrail side of the framework was facing the open end of the trailer; the opposite side of the framework had a hopper and the equipment motor and was facing the truck cab. To remove the framework, a chain was wrapped around the bottom rails and the framework was pulled to the end of the trailer bed by the forklift.



While pulling the framework toward the end of the truck, the framework became “cocked” to one side and lodged or caught on something in the trailer and would not continue to move. The forklift was positioned so the forks were placed under the lower framework cross beams and the handrail side placed against the backrest. The victim climbed into the trailer, went under the framework and knelt on the bed floor while under the framework to see what the framework was caught on and to guide the forklift operator. The forklift operator lifted the framework a short distance from the trailer bed floor. As it was being lifted, the framework became dislodged. The sudden movement allowed it to lurch off of the forks toward the hopper/motor side. The victim attempted, but was unable to get out of the way of the falling framework. The hopper landed on the victim’s back pinning him to the trailer bed floor. The semi-truck driver called 911 and emergency responders arrived. The victim was declared dead at the scene.

RECOMMENDATIONS

- Employers should ensure that powered industrial truck operators properly position and secure all loads before lifting and prohibit employees from working under raised loads.
- Employers should develop and implement a comprehensive safety and health program that includes a powered industrial truck safety program and employee training.
- Employers should conduct a job safety analysis for each individual rigging job.
- Employers should develop and implement a health and safety committee that includes representatives from both management and labor.
- The company should develop a written disciplinary procedure for safety and health policy violations.

INTRODUCTION

On March 11, 2002, a 51-year old male rigger died from injuries sustained when he was pinned between a semi- truck trailer bed floor and the hopper on a piece of metal framework. Later the same day, MIFACE investigators were notified of the work-related fatality by the Michigan Occupational Safety and Health Act (MIOSHA) 24-hour fatality report system that a work-related death occurred. The company agreed to participate in the MIFACE program, and on May 15, 2002 a MIFACE researcher interviewed the owner of the company at the company headquarters. After the interview, the owner and MIFACE researcher drove to the site of the fatality and viewed the framework that was being moved on the day of the incident. The pictures in this report are the pictures the MIFACE researcher took at this site. The death certificate, autopsy results, police report, the MIOSHA narrative, and the MIOSHA citation report were obtained during the course of the investigation.

Powered industrial trucks are frequently used to lift and move heavy loads. Because they are used in thousands of workplaces, they continue to play a role as a significant cause of serious worker injury and death. To increase the awareness of workers who operate or work near a powered industrial truck, the National Institute for Occupational Safety and Health (NIOSH) published NIOSH Alert #2000-112, "Preventing Injuries and Deaths of Workers Who Operate or Work Near Forklifts". Seven fatalities involving forklifts are described. The Alert makes recommendations to prevent similar incidents. The Forklift Alert can be downloaded from the NIOSH website: www.cdc.gov/niosh/2000-112.html

The MIOSHA investigation resulted in three citations to the company: inadequate training regarding hazards of lifting, transporting unsecured loads and the absence of valid operator permits for powered industrial truck operators.

INVESTIGATION

The company is a rigging company that moves machines at client locations. The work often involves disassembling and reassembling the machine during the move. The company has been in business for over 40 years and has 40 employees. The victim's job classification was rigger; there were 14 other employees who had the same job classification. The victim worked full time and had been at the company for 25 years. The victim belonged to the local Ironworkers union, and had successfully completed his apprenticeship training and received his journeyman card. The coworker and victim had been operating forklifts for many years as part of their rigging responsibilities.

The employer does not have a formal written health and safety program and does not have someone within the company who has primary responsibility for safety. The company does not have a written disciplinary procedure for health and safety policy violations. On the jobsite, the union steward is responsible for safety. The company does not have a health and safety committee. The employer does provide health and safety training, such as powered industrial truck operator training and these training

records are maintained. The majority of the training is provided on-the-job and through the union.

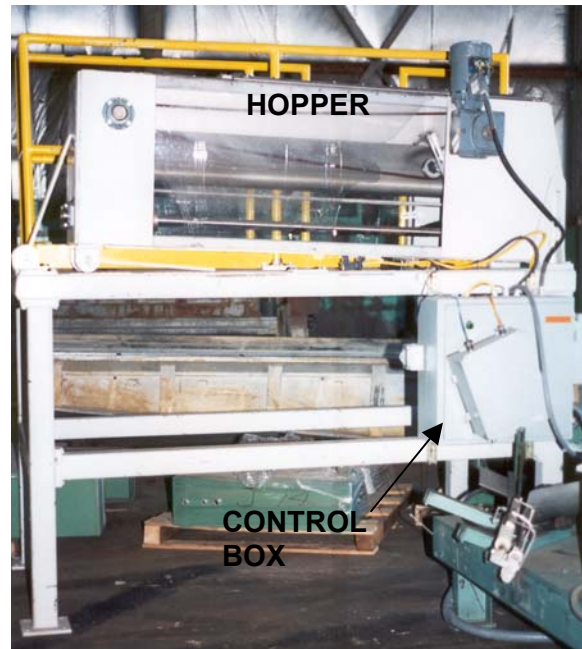
MIOSHA General Industry Safety Standard Part 21, Powered Industrial Trucks defines a powered industrial truck as a “mobile, power driven vehicle used to carry, push, pull, lift, stack, or tier material”. The powered industrial truck used to unload the trailer was a TCM solid tire propane gas-driven high-lift fork truck (herein after referred to as forklift). The forklift tines were 4 feet long and spaced 43 inches apart. The load center was 30 inches and the lifting capacity was 3900 pounds. The forklift used during unloading is shown in Figure A. There was another forklift nearby that had longer tines and a greater load capacity.



Figure A

The company received a semi-truck trailer load from a client that contained various pieces of equipment and other items that were to be stored at the victim’s company storage facility. The enclosed semi-truck trailer dimensions were 40-50 feet long, 99½ inches wide and 111½ inches high. The storage facility did not have a dock. The semi-truck driver backed the truck trailer through the facility’s bay doors until signaled to stop. The semi was set in neutral and the airbrakes in both the truck and trailer were applied. The trailer enclosure had corrugated sides and a scuff rail. A MagLiner mobile dock was available but not used during unloading.

The framework was hollow steel and weighed between 1500-2500 pounds. The 8x8 inch steel plates (1) on the base of the 4x4 inch legs permitted the equipment to be freestanding. The framework was 97 inches long from the outside edges of the steel floor plates and the width from the outside edges of the legs was 53 inches. The bottom horizontal support was 33 ½ inches from the ground; the framework height was 58 inches tall. The hopper setting on a steel plate on top of the framework was 32 inches high. The equipment control box was 11 inches wide, 34 inches long and 23½ inches high. The metal guardrail on top of the framework was 41 inches high. The total height of the equipment was 99 inches. According to the company owner, the equipment was “top-heavy” and the side with the hopper and control box had more weight associated with it.



The framework was located near the middle of the trailer bed. The framework standing on the steel plates and was placed so the guardrails on top of the framework were facing toward the rear doors of the trailer, the control box and hopper facing toward the truck cab. Smaller items on pallets were located near the rear trailer doors and were removed prior to reaching the framework. To unload the pallets from the trailer, one end of a chain

was attached to the lift truck and the other chain end to the material on pallets. The forklift pulled the pallet to the end of the trailer bed, the chain was removed, and the palletized material unloaded. It took approximately 30 minutes to unload the palletized material.

The same process was used to unload the framework. Chains were placed around the horizontal supports and attached to the forklift. The framework was pulled toward the rear doors. The trailer was 99½ inches wide and the framework was 97 inches long. The framework required a straight pull to the rear doors; there was only 2½ inches of clearance between the trailer walls and the framework steel floor plates. The framework was pulled approximately 15 feet toward the doors when it became caught up on something inside the trailer near the rear door. The forklift operator thought that the framework was probably pulled on an angle and the steel plates were caught on the trailer side scuff rail; but it is not definitively known what the framework caught on. The chain was removed from the framework, and the victim climbed into the trailer to help guide the forklift operator.

The forklift operator placed the forks under the horizontal beams. Due to the 53-inch width of the framework, the 4 foot forks did not reach under both of the horizontal cross beams. The side of the framework with the hopper and control box were unsupported by the forklift tines. The forklift driver tried to raise the framework up slightly while the victim



guided the maneuver. The victim had placed himself under the framework, kneeling on the trailer bed to try to see what was caught. MIFACE postulates that the framework steel floor plates, when lifted off the trailer bed, were caught on the scuff rail were placed under tension. When they “broke free” of the scuff rail, the sudden movement allowed the framework to move on the forks. Since the side with the most weight was unsupported, the framework began to tip in that direction. The victim could not get out of the way fast enough, and the framework landed on his back.

The semi-truck driver called 911 and emergency assistance arrived. The victim was declared dead at the scene.

CAUSE OF DEATH

The cause of death as stated on the death certificate was combined crush injuries of chest and compressional asphyxia. No alcohol or drugs of abuse were found in the victim’s blood or urine.

RECOMMENDATIONS/DISCUSSION

- Employers should ensure that powered industrial truck operators properly position and secure all loads before lifting and prohibit employees from working under raised loads.

The incident occurred after the forklift operator tried to lift a load that was top-heavy, had its weight concentrated on one side, and was off-center of the forks. Due to the construction of the framework, the center of gravity, i.e., the point on an object at which all of the object's weight is concentrated, was toward the side of the framework with the hopper and motor. The framework was on a slight angle in the trailer, so the forks were not positioned in a straight manner and the framework was not sitting straight against the load backrest.

The framework was not secured to the forklift prior to the lift to prevent the framework from falling off the forks. As he was lifting the load that was caught on something inside the trailer, he was applying vertical forces to the framework cross members. The uneven weight distribution when placed under vertical stress, caused the load, when it broke free of the obstruction, to move off the tips of the forks and fall forward. The victim crawled over the framework crossbeams and was underneath the load during the lift when he was directing the forklift operator. Workers should be prohibited from working under raised loads so that they are not in the path of a falling load.

The forklift used to attempt to free the framework was capable of safely lifting the framework, but the length of the tines did not completely support the beam cross member on the side of the machine with the most weight. It is unknown if the forks were positioned as far apart as possible prior to trying to free the framework. The forks had been in a position to handle pallets, and to provide more support for the framework, the forks should have been placed a greater distance apart to aid in stabilizing the load.

Although the fork length was 2/3 of the load's width, the side with the most weight was not completely supported. When the equipment jumped off the forks, there was not enough fork length for the equipment to fall on and the equipment rolled off of the tines. Another forklift in the area had longer tines and would have provided more support for the framework side that carried the most weight.

- Employers should develop and implement a comprehensive safety and health program that includes a powered industrial truck safety program and employee training.

The employer did not have a comprehensive safety program, nor did the employer provide formal employee safety education and training that included hazard recognition. Health and safety resources available to employers to assist them in developing a company health and safety program are: (A) MIOSHA Comprehensive Education and Training (CET) Division provides free guidance and assists employers in the development of their company specific health and safety program, (B) health and safety consulting firms, (C) insurance company health and safety representatives, and (D) the Internet.

When developing a health and safety program, employers should make use of the owner/user manuals for equipment used in the workplace. These manuals are important resources with specific information about the equipment, including topics such as maintenance, proper operation, and operator safety. Owner/user manuals should be obtained whenever purchasing equipment, both new and used.

The company's health and safety program should include a comprehensive powered industrial truck safety program includes hazard identification, training (of both truck operators and those working near lift trucks) supervision, operating procedures, maintenance and repair procedures, facility design and lift truck selection criteria. The employer must: (1) select an operators who are both physically and mentally capable of operating the forklift, (2) determine what the operator needs to know to do the job safely, (3) train the operator in those areas of #2, (4) evaluate the operator's performance to ensure that the training has been effective, and (5) conduct periodic re-evaluation of the operator to ensure continued safe operation of the forklift.

Part 21 requires formal classroom and hands-on training for the operators and must be specific to the worksite and equipment used. To assist in training the operators concerning specific forklift equipment, the company applies numbers to the equipment to alert the employee as to the weight capacity the forklift can safely lift. Figure B is another view of the forklift used in the incident. A number in the forties (in this case, 42) indicates that the forklift can be used to lift loads under 4,000 pounds.



Figure B

The company had not provided formal training regarding the hazards of lifting, unbalanced loads and how to lift them properly. Training should also include recognizing forklift-operating characteristics such as stability characteristics, safe operating speeds, maneuverability, and the use of operator seat restraints. Operators must be certified as having passed the training and have an operator permit.

The employer currently provides in-house forklift service and maintenance for their fleet. The operator manual was in the operator compartment. Forklift service records are maintained and consulted to provide timely equipment-specified maintenance. These practices should be incorporated into the powered industrial truck safety program.

- Employers should conduct a job safety analysis for each individual rigging job.

Proper planning can often find problems that could present a danger to workers. MIFACE recommends that employers train workers to be able to conduct a job hazard analysis at the start of a rigging job and periodically during the rigging task. The company health and safety program should have a section about conducting a job hazard analysis for existing and new work procedures, and for providing employee job hazard analysis training. Especially in a "rigging" environment, which accepts orders from many different clients, job hazard analysis training should be conducted so

employees can recognize unsafe work practices and potentially hazardous work conditions when performing the work.

A job hazard analysis begins by reviewing the tasks of each worker and the equipment needed. Each task is examined for fall, electrical, chemical, environmental, or other hazards the worker may encounter. At the completion of the job hazard analysis, appropriate controls and safety training can be used to eliminate the hazards. A copy of the OSHA Job Hazard Analysis publication is included with this report as Attachment A. This document may also be found and downloaded from the OSHA website: www.osha.gov/. Click on the Newsroom Publications link, and scroll down the OSHA publications until the "Job Hazard Analysis" document is found.

A hazard analysis may have identified the potential hazards posed by lifting a top-heavy, unbalanced, unsecured load, as well as working under a raised load within the fall zone of the load. The analysis may also have identified the option of selecting a different forklift, one with a longer fork, to perform the lift.

- Employers should develop and implement a health and safety committee that includes representatives from both management and labor.

The main incentive for developing a Health and Safety (H&S) committee is to encourage and heighten employee involvement in the company safety program. Employee input is a critical part of a successful safety program. An H&S Committee is one way to obtain that input. The level of involvement by employees and degree of management commitment will determine if an H&S Committee is successful.

H&S committees have many benefits; identify safety and health concerns that workers/management consider most critical, help find creative solutions, shows a good faith effort toward health and safety regulations, boosts coworker loyalty, morale and enthusiasm by getting involved in an issue that's important to everyone, and if new safety rules are needed, an H&S committee can help make sure employees accept and follow them. A sample mission statement is contained in Attachment B.

- The company should develop a written disciplinary procedure for safety and health policy violations.

The company should develop a written disciplinary policy for failure to follow written health and safety policies and procedures. The discipline procedure should provide for timely disciplinary action when any employee acts or performs work in an unsafe manner and/or does not follow the established health and safety policy procedures. Management representatives on-site (in this case, the toolpusher and driller) should have a thorough understanding of all aspects of the health and safety policies, and ensure that compliance with these policies occurs during task performance. The disciplinary policy should ensure that the employee knows what the problem is as well as understand what a supervisor's expectations are in order for him/her to correct the problem. The policy should also provide appropriate disciplinary action of consequences for unsafe work behavior/conduct and provide a record of corrective action taken.

REFERENCES

All MIOSHA Standards cited in this report can be found at the Consumer and Industry Services, Bureau of Safety and Regulation Standards Division website at www.michigan.gov/cis. Follow the links *Workplace Safety & Health* then Standards & Legislation to locate and download MIOSHA Standards. The Standards can also be obtained for a fee by writing to the following address: Department of Consumer and Industry Services, MIOSHA Standards Division, P.O. Box 30643, Lansing, MI 48909-8143. MIOSHA phone number is (517) 322-1845.

1. MIOSHA General Industry Safety Standard, Part 21, Powered Industrial Trucks.
2. Occupational Safety and Health Administration (OSHA) website: www.osha.gov, OSHA Job Hazard Analysis
3. National Institute for Occupational Safety and Health (NIOSH) published NIOSH Alert #2000-112, "Preventing Injuries and Deaths of Workers Who Operate or Work Near Forklifts", www.cdc.gov/niosh/2000-112.html
4. Guideline for Safe Operation of Powered Lift Trucks. Ontario Ministry of Labour (April 18, 1997), Canadian safety manual for powered lift truck operation.

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ATTACHMENT A
JOB SAFETY ANALYSIS

ATTACHMENT B

HEALTH AND SAFETY COMMITTEE MISSION STATEMENT

Prior to forming the H&S committee, management should:

- Define the H&S committee's Mission Statement,
- Define the role/function of the Committee,
- Determine the meeting schedule, and
- Determine the length of the meeting.
- Identify H&S Committee members from management and employees.
 - Members should be interested in safety issues and have direct knowledge of the company's operations.

Sample Mission Statement

The mission of the (Company Name) Health and Safety Committee will be to provide leadership in safety and work toward the elimination of workplace injuries and illnesses. The H&S Committee will work to:

1. Assist the company to identify, evaluate and resolve workplace health and safety concerns.
2. Assist in developing and distributing health and safety policies and procedures.
3. Conduct periodic surveys and inspections to identify hazards and recommend corrective actions.
4. Consider recommendations or suggestions concerning health and safety issues.
5. Help to identify employee training needs.

MIFACE

Investigation Report # 02 MI 028

Evaluation

To improve the quality of the MIFACE program and our investigation reports, we would like to ask you a few questions regarding this report.

Please rate the following on a scale of:

Excellent	Good	Fair	Poor
1	2	3	4

What was your general impression of this MIFACE investigation report?

1 2 3 4

Was the report...

Objective?	1	2	3	4
Clearly written?	1	2	3	4
Useful?	1	2	3	4

Were the recommendations ...

Clearly written?	1	2	3	4
Practical?	1	2	3	4
Useful?	1	2	3	4

How will you use this report? (Check all that apply)

- Distribute to employees/family members
- Post on bulletin board
- Use in employee training
- File for future reference
- Will not use it
- Other (specify) _____

Thank You!

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