

TO: Director, National Institute for Occupational Safety and Health

FROM: California Fatality Assessment and Control Evaluation (FACE)
Program

SUBJECT: Shop Foreman Dies After Being Crushed by a Forklift in California

SUMMARY
California FACE Report #95CA008

A 37-year-old male shop foreman (the victim) died after being crushed by the forklift he was driving when it turned over. At the time of the incident, the victim was in the process of backing down a slight grade with the forks raised approximately 60 inches off the ground. The forklift was not equipped with a seat belt so when it turned over the victim fell onto the ground and the forklift roll over protective structure (ROPS) landed on his head. The victim had been using the forklift to pick up cardboard which was stacked on a pallet rack. There were no witnesses to the event. The CA/FACE investigator concluded that in order to prevent similar future occurrences, employers should:

- have seat belts installed on all industrial trucks equipped with ROPS and require that employees wear them whenever operating such equipment.
- require that the forklift forks only be raised as high as necessary while carrying loads.
- provide periodic safety training for forklift operators.

In addition product designers and manufacturers should consider:

- designing forklifts with control systems that prohibit or limit certain maneuvers for given types of load.

INTRODUCTION

On April 25, 1995, a 37-year-old shop foreman (the victim) died after being crushed by the ROPS of the forklift he was driving. The CA/FACE investigator was informed of this incident on April 26, 1995 by a safety engineer from the California Division of Occupational Safety and Health (Cal/OSHA). A site investigation was conducted by the CA/FACE investigator on April 27, 1995. This investigation included an interview with the employer and photographs of the incident site were taken. The forklift involved in the incident was no longer at the site location and a new one had been leased by the employer. A copy of the Cal/OSHA report, and the coroner's report were obtained by the CA/FACE investigator.

The employer in this incident was a manufacturer and refurbisher of copy machines and

had been in business for 6 years. The company had been in business at this location for 4 years and at another site for 2 years. The company employs 15 workers, all of whom were on site at the time of the incident. The victim had worked for the company for approximately 3 years. There was no safety officer on staff nor were there any safety rules in place for the task being performed by the victim at the time of the incident.

INVESTIGATION

At 3:00 p.m. on the day of the incident, the victim was driving a forklift with a load of flat cardboard. The load was two to three feet high, weighed about 150 pounds, and was approximately 60 inches from the ground. He was backing down a 3-5% grade. The employer stated that the victim had gone outside to transport some cardboard on a pallet to a truck. There were no witnesses to this incident. The victim was making a left turn when the forklift turned over and he was thrown onto the pavement. The employer stated that he heard a loud noise and went outside to see what had happened. He found the victim pinned under the forklift with the ROPS resting on his head. The four wheel forklift he was driving was designed with the two front wheels positioned at the outside edges of the truck, while the two rear wheels were adjacent to each other, in the midline of the truck. The forklift ROPS had been factory installed and the employer stated that it was in good condition prior to the incident, but had become damaged during the incident from the impact of hitting the concrete. The forklift was not equipped with a seatbelt. The employer considered the ROPS to have been a forklift cage which would not have required seatbelt use. In order for a structure to be considered a forklift cage, all openings must be less than 6" x 6". The structure on this forklift had 6" x 24" opening.

The employer stated that no forklift training had been provided for the victim by the company, but that he had received training from a former employer in 1978. Records of that training were obtained from the former employer and included a written examination on forklift safety training and lifting requirements. The employer had an Injury and Illness Prevention Program (IIPP) which was in compliance with section 3203 of the California Code of Regulations (CCRs).

Fire department paramedics were summoned to the scene by the employer. A police officer and the fire department paramedics arrived at approximately 3:10 p.m. They were directed to the outside parking area of the business where they first observed the victim. The victim was unresponsive when observed by the rescue team. The fire department paramedics used a forklift, from a nearby business, to lift and pull the forklift from on top of the victim. The paramedics examined the victim at 3:15 p.m. and observed that he had no pulse or respirations.

CAUSE OF DEATH

The Coroner's Autopsy Report stated the cause of death to be craniocerebral blunt traumatic injuries.

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should have seatbelts installed on all industrial trucks

with ROPS and require that employees wear them whenever operating such equipment.

Discussion: In this incident, the forklift the victim was driving was not equipped with a seatbelt.

Although a seatbelt had not been installed at the time of its manufacture, it should have been retrofitted with such equipment. Under Title 8 of the California Code of Regulations (CCRs), Section 3653(a): "Seat belt assemblies conforming to *SAE J386 JUN85*, Operator Restraint Systems for Off-Road Work Machines,... shall be provided on all equipment where rollover protection is installed and employees shall be instructed in their use." The forklift used in this incident had a rollover protective structure that partially functioned as a cage. Under the standard, forklifts with cages are not required to be equipped with seatbelts. However, the structure on this forklift could not be considered a cage since it had an opening 6" x 24" opening. This incident may have been prevented if the victim had been wearing a seatbelt, since the seatbelt would have prevented him from being thrown onto the pavement. In addition, the ROPS would have protected him from being crushed by the forklift, if he had been secured inside the forklift.

Recommendation #2: Employers should require that forks only be raised as far as necessary while carrying loads.

Discussion: This incident may have been prevented if the forks had not been raised to a height of 60 inches. The stability on this type of forklift is greatly compromised at such heights, and it is even more risky when backing down a grade. Under Title 8 of the CCRs, Section 3664(a)(14)(B): "On all grades the load and load engaging means shall be tilted back if applicable, and raised only as far as necessary to clear the road surface."

Recommendation #3: Employers should provide and require periodic forklift safety training for all operators.

Discussion: The victim in this incident had received forklift training seventeen years prior to the incident. However, regular and periodic training is also needed in situations where employees are operating potentially hazardous equipment. In this incident, the victim should have received ongoing training in forklift safety including but not limited to loading and unloading, safe driving speed, safe fork height, and physical restraint. All of these areas could have been addressed in a periodic forklift training class.

Recommendation #4: Manufacturers should consider designing forklifts with control systems that prohibit or limit certain maneuvers for a given type of load.

Discussion: The forklift used by the decedent allowed operators to travel at any speed they wished, up to its maximum, for any type of load and for any type of maneuver. Although a forklift may be able to lift a given weight, it may be prone to rollover for certain configurations of that load or during certain maneuvers. Manufacturers should design systems that monitor the weight, height, and center of gravity of a load, and the speed, acceleration, and directional change of a vehicle. Conditions that would render the vehicle more likely to roll over such as speed, direction, and load height, would then be limited by the system. For example, if an operator was carrying a heavy load at a height that would be unstable above a certain speed, the system would not allow the forklift to travel above that speed.

References

Barclays Official California Code of Regulations, Vol. 9., Title 8, Industrial Relations. South San Francisco, CA, 1990.

John Fowler
FACE Investigator

Robert Harrison, MD, MPH
FACE Project Officer

August 21, 1996

Marion Gillen, RN, MPH
Research Scientist

FATALITY ASSESSMENT AND CONTROL EVALUATION PROGRAM

The California Department of Health Services, in cooperation with the Public Health Institute and the National Institute for Occupational Safety and Health (NIOSH), conducts investigations of work-related fatalities. The goal of this program, known as the California Fatality Assessment and Control Evaluation (CA/FACE), is to prevent fatal work injuries in the future. CA/FACE aims to achieve this goal by studying the work environment, the worker, the task the worker was performing, the tools the worker was using, the energy exchange resulting in fatal injury, and the role of management in controlling how these factors interact. NIOSH-funded, state-based FACE programs include: Alaska, California, Iowa, Kentucky, Massachusetts, Michigan, Minnesota, Nebraska, New Jersey, New York, Oklahoma, Oregon, Washington, West Virginia, and Wisconsin.

Additional information regarding the CA/FACE program is available from:

**California FACE Program
California Department of Health Services
Occupational Health Branch
850 Marina Bay Parkway, Building P, 3rd Floor
Richmond, CA 94804**